ADDIS ABABA UNIVERSITY

School of graduate studies

Department of Economics

Assessing the economic value of protecting lakes in Bishoftu town: the case of lake Babogaya and lake Kuriftu

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ADDIS ABABA, ETHIOPIA

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Assessing the economic value of protecting lakes in Bishoftu town: the case of lake Babogaya and lake Kuriftu

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This is to certify that the thesis prepared by Nigiste Abebe, entitled: assessing the economic value of protecting lakes in Bishoftu town: the case of lake Babogaya and lake Kuriftu and submitted in partial fulfilment of the requirements for the degree of Master of Science (Resource and Environmental Economics) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

This research paper has been conducted on the topics assessing the economic value of lake protection in Bishoftu in the case of lake Babogaya and lake Kuriftu. Protecting lake ecosystem is crucial not only to protect this country's public and economic health, but also to preserve and to restore the natural environment for all aquatic and terrestrial living things. Now days, these lakes are encountered different problems. However, no project plan has been planed and implemented to protect the lakes. This leads the researcher to conduct a research on this issue. The main object of the study is assessing the communities' and visitors' willingness to pay for the two lakes protection. A CVM was applied using biding game elicitation format with a single bound dichotomous choice question followed by open ended follow up question and face-to-face interview were undertaken on a sample of 406 respondents. In the study both descriptive and econometrics analysis are employed. The descriptive analysis to the sustainability of lakes shows that, from residents, 74% of Babogaya and 84% of Kuriftu respondent said it will be difficult for the lakes to sustain without any protection. For this, 55.33% of lake Babogaya and 68.93% of lake Kuriftu visitors said it is difficult to sustain the lakes without any protection program. From this, one can conclude that it is better to propose new lake protection plan. Probit and Tobit model were used to determine the factors that influence the WTP and to identify the basic determinants of maximum WTP respectively. The result from the Probit model revealed that the total cost for visitor, perception for substitution and degree level of education are strongly significant to Kuriftu visitors whereas income and distance are strongly significant to Babogaya visitors. In the Tobit model, number of trip and perception for substitution are strongly significant for the result of lake Kuriftu whereas initial bid and degree level of education strongly significant for the result of lake Babogaya visitors. Similarly, the probit model result for residents show that sex and perception for substitution are strongly significant to lake Kuriftu while perception for substitution and house hold members who has a job are strongly significant for lake Babogaya. The result of Tobit model shows that income and perception or substitution for lake Kuriftu and income of the respondent of lake Babogaya are strongly significant. As the result of the study shows, there are different socio-economic variable that affect the proposed lake protection plan. So, the integrated committee (party) should consider these variables when they design the project. In addition, *a result of the study shows visitors are part of the lake protection plan and they are willing to pay for*

the lakes protection plan in addition to the entrance fee. Therefore, with the collaboration of recreational site owner and government are responsible body to adjust away to collect the money.

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Acronyms

CVM- contingent valuation method

CW- constructed wet lands

EIA- environmental impact assessment

HPM- Hedonic pricing method

MWTP- maximum willingness to pay

RAP- revealed preference Approaches

RUT- random utility theory

SPA- stated preference approaches

TCM- travel cost method

USEPA- U.S environmental protection Agency

WTA- willingness to accept

WTP – willingness to pay

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CHAPTER ONE: INTRODUCTION

1.1 Back ground of the study

Fresh water ecosystem offer important cultural and recreational resources for human population around the world. Lakes hold almost 90% of the liquid surface freshwater on earth, and are major regulators in global carbon, nitrogen and phosphorus cycles (Shiklomanov, 1993). Lakes are important reservoirs for freshwater, purifiers of terrestrial wastes, and zones for aquifer recharge. Lakes provide critical habitat for fish, crustaceans, turtles, birds, mammals, amphibians, insects and aquatic plants, and support biodiversity on surrounding land (Duker and Borre, 2001). Even if water resources give high benefit, a number of human activities are changing the flow of water and interact with the hydrological cycle at many levels. All major water supplies sources have faced a variety of challenges.

Some countries of the world are facing genuine shortages fresh water sources. Moreover, in many other countries even if they have the access of water resources, the tendency of utilizing it properly and keeping its purity is very low. For instance about 50 developing countries, mainly in Africa, still use less than1 percent of their freshwater resources (Gujja and Perrin, 1999). In the past 20 years, available fresh water resources in Africa have greatly reduced due to severe and prolonged droughts. Water pollution resulting from industrial effluent, urban runoff, sewerage and agro-chemicals are increasing from time to time and deteriorate freshwater quality and its quantity. Increasing human water extraction is likely to be one of the primary stresses on freshwater ecosystems in the coming years (Vorosmarty et al, 2000). As populations in developing countries are expected to keep growing at a high pace in the coming decades, pressures on wetlands will surely increase (Schuyt and Brander, 2004). This fact is also applicable for lakes.

Diversion of lakes water for use in irrigation, industry, invasion of plants and exotic species are threatening facts on lake ecosystems. In addition, contamination by toxics and nutrients from industry, farm, sewage, and urban runoff are threatens on lakes. Almost, in all of the continents except Antarctica, all the above listed threatens are a common threatens on lake ecosystem (Ayres et al.1996, Lemly et al.2000, Revenga et al.2000). In most parts of the world, anthropogenic impacts on lakes are spreading geographically due to human population increment and the globalization of trade (Ayres et al. 1996, French 2000). Conservation

measures for lakes, proper utilization and protection of these resources, should be emphasized.

Protected areas offer one important option for addressing both people's need for good quality drinking water and conservation issues linking to fresh water. Protecting lake ecosystems is crucial not only to protect this country's public and economic health, but also to preserve and to restore the natural environment for all aquatic and terrestrial living things. Lake protection and preservation can be achieved by making informed lake management policy decisions at all levels. Some nations are finding it but, difficult to pay or to organize the infrastructure needed to purify water (USEPA, 2009).Water resources development and planning has been the responsibility of governments in several African countries but the governments did not have the financial and institutional capability to install, operate and maintain the water facilities (Donkor and Yilma, 1998). Many of the economic, social and environmental benefits associated with environmental goods and services are not given great consideration. This is because the resources have no formal market, price or expressed cash value.

Protection and sustainable development of lakes and water ecosystems require efficient policies based on knowledge about its value among the societies. Natural resources economists try to get information about people's attitudes and perception for economic values of environmental and water resources. Environmental economists estimate the value of natural and water resources based on amounts that people are willing to pay to protect or increase the resources' services. A typical approach to explain why individuals place values on a natural resource is based on distinguishing between those who use the resource and those who do not (Freeman 1993). As a result, total economic value is not only use value, but the sum of both use and non-use. Economists developed several techniques for placing monetary values of non-market goods and services. There are various non-market valuation techniques used to estimate the values of environmental resources (Mitchell and Carson, 1989). One of these techniques is a contingent valuation technique which is applied for this study.

The wetland ecosystem of Ethiopia includes twelve drainage systems/basins, over fifteen natural lakes, many swamps, marshes, floodplains, and man-made reservoirs. As a land locked country, Ethiopia lacks wetlands that are associated with coastal areas; otherwise, all

wetland types (Ramsar convention 1971) that exist in different parts of the globe also available in the country. Most of the wetlands in the country can be considered as freshwater wetlands. There are abundant lacustrine type of wetlands that include lakes of the Rift Valley (Lakes Ziway, Langeno, Awassa, Shalla, etc), Lake Tana, Lake Bishoftu and many other crater lakes and their associated wetlands (Forum for environment, 2007).

When we come to the study area, Bishoftu town has eight lakes. Namely: Bishoftu, Hora-arsedi, Chelleleka, Kuriftu, Kilole, Green, Babogaya and Balabala. Even if the town is rich in its lake resources, some of the lakes are degraded. In order to minimize some threats lake conservation or protection programs are required. To achieving better management of these resources require understanding of the function of the ecosystem. And also it needs sufficient planning, financial resource and community participation. In order to solve the financial problem for the formulation and implantation of the lakes' protection program, new studies are required. This study is one of the newly established plans which shows alternative source of finance from resident and visitor in order to inform policy for concerned body about lake Kuriftu and lake Babogaya protection.

1.2 Statement of the problem

Lakes are the most important ecosystems contributing to the national and local economies by producing a wide range of goods and services. In addition, recreational and aesthetic benefits, soil formation, nutrient cycling etc are some importance of lakes (Turner et.al, 2000). However, lot of problems are encountered to the lakes which includes excessive influx of sediments, entry of diffused source nutrients, improper utilization of storm water combined with over abstraction and over-exploitation of lake. In order to control or minimize the above problems of lakes, protection and/ or conservation programs are required.

Effective water resources development is widely recognized as crucial for sustainable economic growth and poverty reduction in developing countries (World Bank 2004; Grey and Sadoff 2006). However, such development incurs costs as well as benefits. In order to maximize benefits and minimize costs, it is essential that decision-making incorporates different stakeholder perspectives (McCartney and Awulachew 2006. In order to find an

alternative source of finance in response to the threats of lake ecosystems, large research efforts are needed for the sake of estimating the economic value of Lake Ecosystem.

Different feasibility studies were conducted in line with protection of fresh water sources, (Yapping (1997), Nallathiga and Paravastu (2003), Yang et al (2008), Halkos and Matsiori (2012)). Beside this, in Ethiopia some studies had been conducted by Yibeltal (2009), Haymanot (2007), and Tsegaye (2005). There are studies conducted at Bishoftu town one to analyze factors affecting the WTP for water quality of Lake Hora-Arsede by Haymanot (2007) and another one is the study conducted on recreational value of Lake Babogaya by Amenu (2014). However, no study has been conducted to assess the economic value of protecting Lake Kuriftu and Lake Babogaya.

Bishoftu town offers different types of accommodation, including high standard hotels, resorts, lodges and recreational centres. The Lakes which are existed in Bishoftu town have high potential for natural and cultural tourist attraction and different economic values for the town as well as for the country at large. Diverse flora and fauna, endemic bird and plant species are existed. Even if lake ecosystems have high economic value, currently they are deteriorated by human activities. One of the causes for degradation is problem related to the constriction of different lodges and Resorts. Other causes are rise from small agricultural activities and pollution from different source reduces the lakes quality and quantity throw time. Part of the lakes and their surrounding area extremely polluted and improperly used.

The degree of degradation is different among lakes. Still now, even the lakes which exist in Bishoftu are at risk, only one project on Lake Kuriftu is done even if this project is not employed practically due to financial constraints. For the improvement of water quality and quantity of the degraded lakes and also for effective usage of those lakes, new project is gonging to be needed. To formulate and implement new project (which is gonging to be done on lake protections) require enough financial capacity.

This research is different the study done before in the following point:

- The study is done by combining the artificial lake (i.e. Kuriftu) and the natural Lake (Babogaya) as a case study in order to show the importance of lake protection

projects for the lakes of Bishoftu town. This crate a chance for researcher to inform policy implication about the lake Kuriftu and lake Babogaya protection.

- The researcher selected the respondents from residents and visitors it help to understand the willingness to pay responses of visitors and residents separately for lake Kuriftu and lake Babogaya.
- The proposed hypothetical protection program is also different in the point of multiple improvement program included than that of single improvement program which is done before. That crate high motive for respondents to give response or to be intrusting in the hypothetical proposed program. Beside this to evaluate respondents' attitude and WTP, the researcher formulated protection plan which included: clean up the surrounding environment of the Lake, improve water quality of the lake, in order to establish sustainable and proper utilization of the lake to sustain and improve the water quantity of the lakes.

Since the lakes are exposed to different threats, based on the threats identified, lake protection projects are going to be implemented accordingly. Therefore, this research is designed to show an alternative source of finance in order to inform policy to establish lake protection plan.

1.3 Objective of the Study

The main objective of this study is to estimate respondent (i.e. residents and visitors) willingness to pay (WTP) for protection of lake Kuriftu and lake Babogaya.

The specific objectives

- To examine whether respondent are willing to pay for lakes protection
- To identify factors affecting respondent's willingness to pay for lakes protection

1.4 Significance of the Study

First and for most, this research will be very important for the city administration of Bishoftu town to have some benchmarks or clues to formulate lake protection programs. Second the study will also have significant for the surrounding community to make them to be conscious enough to preserve resources and keep up their economic value. Another function of this research will be, for policy makers and environmental as well as natural resource experts to

formulate similar systems or projects to preserve other lakes. Finally, this research will serve as a spring board for other researchers who are going to conduct a research on similar issues.

1.5 Scope of the study

Bishoftu town has eight lakes. This study, however selected two lakes (i.e. Kuriftu and Babogaya) as a case study out of eight due to shortage of time and financial constraint. The two lakes are selected due to those lakes are more deteriorated than others. It is known that there are many direct beneficiaries of the lake and other responsible bodies like government, recreational site owners, employees in recreational site, and some fisher men and so on to protect the lakes. However this research is aimed at assessing only residents' and visitors' WTP to protect the lakes. From the residents, only those who are living in three Kebeles closer to the lakes have been taken.

1.6 Limitations of the study

The study used a hypothetical market to value lake protection, there might be differences between actual and hypothetical improvement. In addition to that, respondents not tell their true willingness to pay. Thus care should used be taken in interpretation and using of the results.

1.7 organization of the study

This study has five chapters. The first chapter deals with introduction of the study which includes background of the study, statement of the problem, objective, significant of the study and scope and limitation of the study. The second chapter is about reviewing related literatures and the third chapter consists of the methodology part of the study. The empirical results and discussions are found in the fourth chapter. Finally, the conclusions and policy implications of the study have been in chapter five.

CHAPTER TWO: Literature Review

2.1. Theoretical literature review

2.1.1 Economic valuations of non-marketed goods

Valuation is not a single activity, and the seemingly simple question 'how valuable is an Ecosystem?' can be interpreted in many different ways. It could be interpreted as asking about the value of the current flow of benefits provided by that ecosystem, for example, or about the value of future flows of benefits.

Public policy decision-making often involves balancing the costs of a policy with the benefits (Mitchell and Carson, 1989) .The effects are also visible from consumers' response to changes in prices and incomes. But this works only when goods and services are traded in a normal market. Freeman (1993) noted that a number of current environmental and resource policy issues involved in one way or another questions of economic values and trade-offs. But how can one render policy recommendations when its effects are not observed in price and income. It is evident that information should be inferred based on changes in consumer behaviour on the values of non-marketed goods. Humans tend to consume more of priceless environmental commodities than what is optimal, both from human and environmental points of view. Overuse of natural resources and environmental degradation to some degree can be explained by lake of market prices (Perman et al., 2003).

Measuring values involves the use of economic theory and technique. The foundation for economic concept of value is neoclassical welfare economics. There are many definitions of the word "value". Today value is regarded as synonymous with the price of resources though earlier philosophers of the subject made a distinction between the two concepts. Even though there is no one accepted definition of the value of an economic resource, since its definition depends on angle. One is looking, it is important to have a meaning of the value of a resource to "value" a typical household places on the change in the quality of provision of the resources. It is also possible to determine factors that can influence someone to perceive the value of the resource to be. So, Value means the contribution of an action or object to user-specified goals, objectives or conditions (Costanza et al, 2000).

A typical approach to explain why individuals place values on a natural resource is based on distinguishing between those who use the resource and those who do not (Freeman 1993). Economic value is a measure of what the maximum amount an individual is willing to forego in other goods and services. Natural resource economists divide value into two main categories: use value and non-use value. As a result, total economic value is not only use value, but the sum of both use and non-use values.

Use value refers to the intended use of the service and good by an individual. The use value also divided in two. One type of use value is direct, such as longing, fishing and hiking, recreation, and tourism, while the other indirect. The direct further divide in to former refers to both consumptive and non consumptive uses that involve some form of direct physical interaction with the resources and services of the system. Consumptive uses involve extracting a component of the ecosystem for an anthropocentric purpose such as use of water for transportation and recreational activities such as swimming and non-consumptive (recreation, tourism) values. There are also indirect-use values: indirect benefits arising from ecological systems biological support, climate regulation, physical protection and global life support. It is also increasingly recognized that the livelihood of population in areas near aquatic ecosystems may be affected by certain key regulatory ecological functions (e.g., storm or flood protection, water purification, habit function) (Perman et al, 2003).

The second category is non-use values, which are slightly more complicated, however, and involve a more abstract concept of valuation. There are three kinds of non-use values. Altruism is a non-use value obtained from the welfare of other individuals or groups. In this case, altruism might motivate a passenger to offset emissions because it improves the air quality for others. Bequest value is also one of the non-use values that are related with the welfare of future generations. For example an elderly airline commuter may choose to buy offsets because s/he may want her grandchildren to live in a world with cleaner environment**.** Finally, existence value refers to the non-use value which derived from merely knowing that some aspect of the environment exists. We might be WTP for clean air, for example, just for the sake of knowing that it is clean. In general total economic value is the summation of use and non-use value (Perman et al, 2003).

2.1.2 Non-Market Valuation techniques

According to Mitchell and Carson (1993), classification of methods for estimating values is based on two characteristics of the methods. The first characteristic is whether the data come from observations of people acting in real world settings where people live with the consequences of their choices; or come from people's responses to hypothetical questions of the form "what would you do if…" "Would you be willing to pay…?" The second characteristic is whether the method yields monetary values directly or whether values must be inferred through some indirect technique based on a model of individual behaviour and choice.

The individual demonstrates preferences which, in turn place values on environmental resources. That society values environmental resources is certain; monetizing the value placed on changes in environmental assets such as coastal areas and water quality is more complex. Environmental economists have developed a number of market and non-market-based techniques to value the environment. Environmental valuation techniques broadly classified into two approaches:

1. Revealed Preference Approaches (RPA) and
2. Stated (or expressed) Preference Approaches (SPA)

2.1.2.1Revealed preference approaches

Revealed preference approaches make use of individuals' behaviour in actual or simulated markets to infer the value of an environmental good or service RPA uses the information that is available in the market and is specifically related to the non-marketed value under consideration to infer value estimates. The two best-known methods of the RPA are the travel cost method (TCM) and the hedonic pricing model (HPM).

Travel Cost Method (TCM)

TCM is one of the categories of revealed preference that costs incurred by visitors could be used to develop a measure of the recreation value of the sites visited. In general TCM focuses on recreational uses of natural resource. The central idea of TCM is to infer the values placed

by visitors on the environmental amenity services from the costs that they incurred in order to experience the services (Perman et al, 2003).

Problems (limitations) with TCM

1. Measurement of travel cost; time cost since simply measuring the time spent travelling is not always straight forward. The monetary cost by itself does not receive much attention, for example consider the matter of a visitor to a site who travels to it from a location where he or she is spending vacation. Should site travel cost be assessed as just the expenditure incurred in getting to the site from the vacation location, or should some proportion of the expenses of getting to the vacation location from the normal place of residence be included? If the latter, how should the proportion be decided? Moreover, consider those who visit several sites during the course of a day trip from home. So how the total travel costs should for the day be allocated over the sites visited? These examples indicate that the measurement of TCM involving actual monetary expenditure is something which involves judgment on the part of the TCM analyst (Perman et al, 2003).

2. Data requirements and statistical (econometric) problems: functional form, estimation method. The trip generating equation shows that linear function but no particular reason apart from convenience. In addition in TCM the trip generating equation parameters are estimated by the method of ordinary least squares, but latterly it has been realized that there are a number of reasons why this may give rise to biased estimates of the parameters. Rather the estimation method depends on the functional form for the trip generating function (Perman et al, 2003).

Hedonic Pricing Method (HPM)

The HPM is another technique that determines environmental valuation under the category of revealed preference. The earliest applications HPM were planned to capture the WTP measures related with variations in property values that result from the presence or absence of particular environmental goods or services. This technique were under taken by comparing the market value of two properties which differ only with respect to a specific environmental attribute, economists may assess the implicit price of that amenity by observing the behaviour of buyers and sellers. Therefore; the variation on the approach of comparing the

effects of an environmental attribute would involve comparing the price of a single piece of resource over successive sales.

Disadvantages of HPM

Most environmental incidents have only small effects on housing prices. Even where the effects do exist, it may be difficult to estimate those using econometric methods because many factors, many of which are correlated, influence housing prices. For example, a house that is located near a factory with emissions that can reduce the air quality may be in a poorer section of town where schools are not as good and there are few other amenities. Even when implicit prices for environmental amenities can be estimated, it is usually very difficult to obtain measures of value from these models. The relationship between the implicit prices and the value measures is technically very complex and sometimes empirically unobtainable (Khalid, 2008)

2.1.2.2 Stated preference approach (SPA)

Stated preference method to elicit environmental value is largely based on the assumption that individuals are WTP for environmental gains and, on the other hand, are WTA a compensation for some environmental losses (Perman et al, 2003). In the SPA peoples are asked their WTP for hypothetical situation.

The stated preference approaches used for valuing both use and non-use values of environmental resources. The original and the most commonly used stated preference method is the contingent valuation method (CVM). Other forms of stated preference approaches include conjoint analysis, choice experiment, contingent ranking, and contingent rating (Bochstael et al 2005) .I discuss only the contingent valuation method for it is the most widely used stated preference methods.

Contingent Valuation Method (CVM)

CVM is one of the SPM which directly ask people in a hypothetical market for environmental goods/services what they are WTP for the benefit they obtain and/or what they are willing to receive by way of compensation to tolerate a cost. CVM survey uses questions to elicit people's preferences for public goods by finding out what they would be willing to pay for specified improvements in them. The essence of the method is aimed at

eliciting peoples WTP for a public good in order to circumvent the absence of market. The ultimate aim of CV survey is to obtain an accurate estimate of the benefits from a change in the level of provision of a public good, which can then be used in Cost-Benefit analysis.

Davis did the first empirical research in 1961 in valuing outdoor recreation. Since then the method become one of the widely used valuation approach in water and sanitation services, urban air pollution, soil erosion, deforestation, biodiversity, watershed management and ecosystem valuation (Whittington, 2002).

The advantage of CVM surveys is that they capture both use value and non-use values such as altruism, bequest, and existence values. Non-use values are also helpful in capturing uncertainty about the future. The increasing uncertainty surrounding environment change may increase the bequest or altruistic values of conservative respondents.

Challenges of the Contingent Valuation Method

A CVM surveys to assess WTP is that they depend heavily on hypothetical situations. The hypothetical nature of this valuation technique often generates biases, which systematically understate or overstate true values. Not only biases but other problem areas in CVM, those are: embedding, WTP/WTA differences, information effects and the transfer ability of benefit estimates (Hanley et al., 1997). The study discussed only the problem related to biases. There are a number of types of biases indicated in the literature, but the major ones are:

Hypothetical bias: may be due to the individual who may not understand the characteristics of the good or who may not bother to answer accurately. This bias reflects that there is a lack of clarity in the survey design. It is therefore critical for the researcher to carefully describe the environmental good or services that are going to be surveyed (Perman et al, 2003).

Strategic bias: occurs when respondents properly realize their WTP but do not respond honestly. It is related to situations where the individual thinks that he or she may influence the investment or policy decision. The individual may overstate his or her WTP, assuming

the government will provide the service with high subsides in case he/she responds positively. On the other hand the individual may under state his/her willingness by assuming that the investment has already been decided on (Whittington et al 1987).

Starting point bias: results when respondents' final bid is affected by the starting value suggested to them in the beginning. It is related to the so-called "bidding game" the choice of a low (high) starting point leads to a low (high) mean WTP (Bateman and Tuner, 1997). Such a bias is usually encountered when using open-ended questions with variable bids.

Information bias: this occurs whenever respondents are forced to reflect their valuation to attributes with which they have little or no experience. In such cases, the amount and type of information presented to respondents may affect their answers. It can occur either as a result of providing too little information about the choice offered or from misleading statement by the interviewer.

Compliance bias: may occur when a respondent wants to please the interviewer or the sponsor of the study. This problem is strongly culture related. Sampling biases or non-respondent bias and other also exists.

So to minimize the potential biases of the method and to get reliable information from the CVM studies it is advisable to design survey instruments including the use of focus group discussion and pre-testing carefully and to use well-trained and experienced interviewers (Whittington, 2002).

Stage in CVM analysis

For environmental quality through CVM, WTP for a hypothetical product or service can be obtained. According to the theory, if demand for this service exists, then this must be reflected by WTP. A high WTP is logically a proxy for its demand. Thus the value placed by a consumer on a service can be expressed as WTP to obtain it. They are five stages in a CVM analysis (Hanley et al., 1997). Those stages are:

1. Setting up the hypothetical market

2. Obtaining bids
3. Estimating mean WTP and/or WTA
4. Estimating bid curves and
5. Aggregating the data

Value Elicitation Formats

There are different elicitation methods (formats) to evaluate CVM. Those are:

Open ended: A CVM survey question in which the respondent is asked to provide the interviewer with a point estimate of his or her maximum WTP (WTA). This method avoids starting point bias large number of non-response error but it faces with large number of zero responses and few small positive responses

Bidding game: is also a CVM question format, in this case individuals are iteratively asked whether they would be WTP a certain amount or not. The bidding stops when the iterations have converged to a point estimate of WTP (WTA). In the bidding game the final estimates depends on the initial price which can create starting point bias. Not only this may the format system by itself be boring to respondents so they may give answer only to avoid additional question.

Payment cards: under this type of CVM question format individuals are asked to choose a WTP (WTA) point estimate (or a range of estimates) from a range of values shown to the respondent on a card. This technique is weakly dependent on the estimated amount used in the card but it needs literate respondent.

Dichotomous or discrete choice CVM: A contingent valuation question format in which respondents are asked simple yes or no questions of the stylized form: Would you be WTP $ x? The advantage of this format is that it is easy for the respondent to pick the posted price, but still starting point bias may arise so large sample size can minimize the problem.

Closed-ended with follow up: in this CVM question format the method starts with closed-ended question followed by open-ended follow up questions to obtain the actual MWTP amount.

2.2 Empirical review

There are various empirical studies undertaken in measuring the economic value lake protection throughout the world. Some studies that used CVM in valuation of lake protection are presented as follows:

Zylicz et al (1995) carried out a study to estimate the economic value of eutrophication damage in the Baltic Sea Region, Poland. The study used CVM to looks at Polish beach users' willingness to pay to clean up the Baltic Sea and coast. These show promising signs that such monetary valuation is possible, even in situations and cultures where it was anticipated many difficulties would be encountered. The results of study show that a substantial number of users at the Polish Baltic Sea coast were willing to support the idea of a tax levied on all Poles for the sake of protecting the Baltic Sea from eutrophication. The author conclude that estimation of mean WTP indicates that users are WTP a substantial part of an average one months' salary for protective measures. And also the nature of dichotomous choice questions suggests that the WTP estimates found are upwards biased, and if we compare the estimates with those obtained from the open-ended pilot study, it is found that this bias may be quite large.

Yapping (1997) applied CV and Travel cost Method to estimate the value of improved water quality for recreation in East Lake, Wouhan, of China. The survey concentrated on the users group. In the total 600 of the 501 questionnaires returned, 408 are used for TCM and CVM analyses. The necessary information for estimation of WTP had been elicited using open-ended questions. The results of multivariate regression analysis show that improving the water quality to swimmable quality and drinkable level could increase the unit value of Lake by CNY18.09/m^2 and 32.13/m^2 respectively. They found that CV values are higher than those from TC are. Income and education are individual significantly at 99% level of confidence and hence important s determinants of WTP of respondents.

Nallathiga and Paravastu (2003) conducted contingent valuation survey to determine the economic value of water quality improvement for river Yamuna in India. The study employed a CVM based on double bounded format. About 125 housed hold were randomly selected from representative clusters. The result of multiple linear regression analyses

showed that the average WTP for current river water quality maintenance was found to be Rs.73.86 per capita per year, while maximum WTP of it was found of it was found to be Rs.77.86. The results indicate that the willingness to pay for the river water quality improvements is small but significant. Income and perception are important determinants of WTP.

Coopera et al, (2004) conducted the study on the structure of motivation for contingent values: a case study of lake water quality improvement. This study examines the role of such motives by using measures of attitude and motive strength to interpret willingness-to-pay (WTP) values for a set of nested environmental goods with potential use and non use benefits. Social motivations possibly associated with the benefit of contributing to a public good rather than the benefits of the good itself are potentially relevant to the WTP decision but do not give rise to separable values. The strength of perceived personal responsibility for provision of the good is significantly associated with WTP but also with the theoretically desirable property of enhanced scope sensitivity. WTP is not found to be associated with the extent to which the individual feels under some general moral obligation to contribute to ‘‘good causes’’. Motives arising from ethical concerns for the environment and altruism are also potentially relevant to WTP but are closely related to underlying motives associated with existence and personal use values, respectively. The associations among motives found here also suggest that investigations of any particular motive should be conducted in context.

Imandoust and Gadam, (2007) conducted study on people willingness to pay for river water quality by using contingent valuation survey in the Pavana river in Pune city, India. Contingent valuation method (CVM) was utilized for valuation of river water quality in Pavana River. Five categories of users have been chosen and then interviewed: households, farmers, fishermen, washing clothes women, bath taking people. Mean of willingness to pay was estimated at Rs 17.6 (45 Indian Rupees=$ 1) per family per month. They recommended that, public awareness especially among slum-dwellers should be done by PCMC and NGOs. Municipal should monitor industrial effluents and the permits or” No Objection” certificates production should not be issued for industrial units polluting the river water. Fortunately most of respondents trust municipal and if they see some progress in cleaning river process; people’s participation in the scheme will increase. Moreover NGOs should be supported by

government. Some people prefer to help NGOs or charitable institutions for cleaning of the river.

Yang et al (2008) analyzed ecosystem service value assessment for constructed wet lands: a case study in Hangzhou, China. All three hundred questionnaires sent out were retrieved. Four, however, were incomplete and, therefore, there were 296 usable questionnaires in total. Interviews were carried out face-to-face. The contingent valuation method (CVM) and shadow project approach (SPA) were applied to estimate the economic values of constructed wet lands (CW) system ecosystem services. The CVM estimated a value of 800,000 Yuan (Yuan: Chinese Currency, 7.6 Yuan=1 USD as of August, 2007) as the total economic value of the CW in a twenty year period. Meanwhile, the SPA calculated a value of 23.04 million Yuan as the total economic value of the CW in a twenty year period. It is determined that compared to the CVM, the SPA provides a more approximate value of the true monetary value of the Hangzhou Botanical Garden CW. The study shows that constructed ecosystem services contribute substantially to human welfare as natural ecosystem services do. Other types of value (religious, social, cultural, global, intrinsic and aesthetic, etc.) are also important, but the economic value tends to be the most important value for most countries, especially in developing countries, like China, when policy makers must make difficult choices concerning the allocation of scarce government resources.

Douglas and Harpman, (2009) were made a study on Lake Powell Management Alternatives and Values: CVM Estimates of Recreation Benefits in USA. The CVM questions covered three resources management issues including water quality improvement, sport fish harvest enhancement, and archaeological site protection and restoration. The estimated benefits are remarkably high relative to the costs and range from $6 to $60 million per year. The dichotomous choice format was used in each of three resource CVM question scenarios. The CVM estimates of the benefits provided by potential resource improvements are compared with the costs of the improvements in a benefit-cost analysis. The authors used logistic and Probit probability frequency distribution functions (pdfs). The authors recommend successful multi-agency efforts to fund amenity improvements at Lake Powell have to be buttressed by data that indicate that the public attaches high values to Lake Powell non-market amentity.

Halkos and Matsiori (2012) conducted a study on the point of assessing the economic value of protecting the artificial Lakes, by using CVM. The study was employed a logistic model followed by a Tobit and they apply the two hurdle model for analysis. The WTP was derived from a face-to-face survey of 564 residents and recreational users of the Plastira's lake, one of the most important constructed wetlands in Greece. The study found a higher WTP of individuals towards the lake's functions and their desire to prevent possible diminutions of its total economic value and study show that the most important variable is pro-environmental behaviour. They also found that respondents have different behaviour for lake's economic value according mainly to their origin (residents or recreational users). Demographic variables (like income, age, gender) together with the extracted factors have a strong impact on the decision of individuals to pay as well as on the specific amounts stated. In conclusion, an important finding of the study is the influence of lake's functions on people WTP for its protection.

The study conduct by Nandagirib, (2015) was taken up to evaluate the economic value of water as related to recreational use at the Pilikula Lake, Mangalore, India. The objective was to estimate visitors' WTP for services rendered by the facilities available at the lake using TCM and CVM. A zonal approach was used for the valuation in TCM, and Open-Ended questions were used for CVM elicitation. Data collection was completed through direct interview with 500 visitors at Pilikula Lake using a questionnaire. One of the most important policy implications is that Swimming and water fountains are the expected extra facilities. If the authorities provide these extra facilities, there can be significant changes in visitation rate. In addition the difference in CV and TC value is much more in this case study because of the visitor's inhibition to reveal WTP values considering political and socio-economic factors in developing countries like India.

In Ethiopia case there are some study done in the point of conservation of water quality of lakes, water quality and protection of park WTP. Not only this point but also by using CVM there is other a lot of study done but I take the related topic only.

Deffar (1998) conducted a study using CVM to determine the economic value of Abiyata-Shalla Lakes National parks. It deals with cost benefit analysis of conserving the Lake as a park and producing Soda ash around the river. According to his finding, WTP of respondent

is a function of visitors' income, length of visit in day, years of acquaintance with the park and visit cost or ease of access. All explanatory variables were significant at 10% permissible error. He recommended that even if the production of Soda ash is important in providing inputs for domestic industries and for earning foreign currencies, conserving natural resources is much more important for sustainable economic development.

Terefe (2000) adopted the CV method and the travel cost models to estimate benefits from establishment of park around Tis Abay waterfalls. Using multiple linear regression, probit and Tobit models, the CV responses were analyzed. The results revealed that, for the visitors' benefits, the CV produced higher estimates than the TC estimates. The author argued that since CV estimates consider also the non- use value of the commodity to be valued and TC estimates do not, the results obtained are in agreement with the theoretical underpinnings of the models. One of the recommendations of the study is that the finding showed that successfully conducted CVM and TCM surveys would give useful information on user demand for public services such as recreation.

Tsegaye (2005) used CVM by applying double bounded format to elicit the willingness to pay (WTP) of fishermen to the improvement of Lake Chamo. The mean willingness to pay is birr 4.63 per month. His analysis showed that is a positive and significant correlation between willingness to pay and income of house hold, education level of the respondent and the dummy variable Chamo. However, the response is negatively and significantly correlated with the age, perception of the respondent about the existing quality of the Lake and sex of the respondent male.

Haymanot (2007) used Contingent Valuation Method (CVM) which is adjusting to derive demand side information for water quality improvement on Lake Hora-Arsede. The study used the single bounded dichotomous choice technique followed by an open-ended question for eliciting to the willingness to pay of household for the Lake clean-up. A total of 250 residents were used. Probit and Tobit models were applied to identify factors affecting WTP. The mean willingness to pay estimate, birr 11.42, from closed ended format aggregated for the total population and total willingness to pay of the residents was found to be 119,893 birr per month and 1,438,716 per annum. The study revealed that the distance of the respondent's

homestead from Lake, perception of the existing Lake water quality, awareness of environmental problems, income of the respondent, sex of the respondent and family size are factors significantly affect the willingness to pay off a household for lake clean-up. One of policy implication of the study is that the lake has a potential for tourist attraction and it would have played a significant role in tourism sector of the country. Therefore, concerned body should improve recreation experience quality and increase types of the lake recreational services in order to attract both local and foreign visitors.

Yibeltal (2009), this study analyzed the economic values of biodiversity conservation for local communities, in the context of protected areas in Ethiopia, using contingent valuation method (CVM). A contingent valuation questionnaire survey of 138 households from three districts living in and adjacent to Abijata-Shalla Lakes National park is carried out to evaluate the total economic value of the park and its natural resources to local communities. A two-stage systematic random sampling design and dichotomous choice elicitation method are used to conduct the contingent valuation survey. The household WTA results are analyzed using Logit regression model. The average WTA of a household residing within the vicinity of ASLNP is estimated to be $902.08 amounting to $5.24 million for the total households of the park area. In contrast, the average opportunity cost of a household, in terms of agricultural benefits forgone, is estimated to be $645.97 per year amounting to $3.75 million for total households of the park vicinity. The high WTA and OC values are reflected in the attitude and perception assessment where over 76% of respondents regard the conservation and continued existence of the park as insignificant to their livelihood. The results provide a basis to address challenges of the firmly intertwined poverty and degradation of natural resources in the area.

Chapter three: Methodology of the Study

3.1 Description of the study area

Bishoftu is a town, lying south east of Addis Ababa. It was formerly known as Debre Zeyit. The town is located in the East Shewa Zone of the Oromia Region, and has an elevation of 1,920 metres (6,300 ft). Bishoftu is located 47.9 kilometres (29.8 mi) southeast of Addis Ababa along its route 4 highway. Bishoftu is also home to the Ethiopian air force and a station on the Addis Ababa Djibouti rail way. The town has nine kebeles, and an estimated a total population for Bishoftu of 200,000, of whom 95,600 were men and 104,400 were women. The town is rich in different natural and manmade attractive areas. From mountains, Mount Yerer is a well known mountain around the town. Moreover, the town has 8 lakes which are both natural and artificial. These are: Lake Kuriftu, Babogaya, Bishoftu, Hora-arsedi, Green, Kilole, Cheleleka and Balabala.

3.2 Sampling techniques and Procedures

In this study, both probability and non-probability type of sampling technique was used. In the first stage, two lakes (Kuriftu and Babogaya) were selected out of the eight lakes that existed in Bishoftu town. Those two lakes selected through a method of purposive sampling technique. The reason behind selecting these lakes purposively is first relatively the lakes are facing more problems. The other reason is depending on their difference in water level (i.e. from high water level lakes Babogaya and from low water level lakes Kuriftu are selected. Another case that leads the researcher to use purposive sampling to select the lakes is the benefit that the lakes are giving for users in which the lake give recreational services relatively for long period of time .

The three Kebele administrations (Kebele 09, Kebele 14 and Kebele 15) were purposively selected out of the 15 administration Kebele of Bishoftu town because of their proximity to the lakes under the study area and since people around these lakes are expected to be familiar with the lakes and can give sufficient information for the study. In relation to visitor side, only domestic visitor were selected purposively, due to the expectation that they have moral obligation to protect their country's resources than foreign visitor who have high substitution and alternative recreational site.

Simple random sampling was used to select respondents from Lake Babogaya and Lake Kuriftu. Beside this for both lake residents and visitors were simple selected through lottery method from selected area. In the study a total of 416 respondents were selected, out of these only 10 respondents are excluded. From a total of excluded, 6 of them are protest answer (i.e. over state their willingness to pay) and the remaining 4 are as the reason of they didn't give their full responses. From a total of 406 respondent, 200 respondents were selected from resident of Beshoftu town where as the remaining 206 were selected from visitors of lake Kuriftu and Lake Babogaya. Among 206 visitors, 103 were selected from lake Kuriftu and the rest were select from lake Babogaya. Similarly 200 residents selected from Bishoftu town. Half of the resident requested their responses for Lake Kuriftu and the remaining were asked to give their responses for Lake Babogaya.

3.3 Data source

The main data type used in this study is primary data. The primary data has been collected with questionnaire and face to face interview. All of 200 residents' responses collected trough CVM questioner which is administered in form of interview. Similarly from a total of 206 visitors, 150 respondents response collected through CVM questioner where as, 50 questioner administer trough interview.

3.4 Questionnaire Design and Administration

The draft questionnaire was pre-tested on 40 randomly selected respondents. From these 40 pre-tested respondents, 20 were from residents and the remaining 20 were from visitors. In this phase all six collectors and the researcher have participated. The pre-test has a paramount significance in making appropriate modifications in the content of the questionnaire. The main purpose of the pilot survey was to set the starting price of the bidding game in the elicitation part of the questionnaire. During the pilot survey, the WTP part was both closed ended and open ended. After carefully observing the trend of the data obtained from the pilot study, the researcher is decided to take the mean of stated amount of WTP as initial bid. Here the starting point prices for residents 15 birr per season (which means four times a year) whereas for visitors, for Lake Kuriftu 10 birr person per visit. For lake Babogaya 4 birr an 10 birr person per visit as initial bid. In addition to pilot survey, the initial bid was determined by considering the entrance fee difference among recreational sites.

The final version of the survey questionnaire designed for this study has three main parts (annexe9) the first section the questionnaire deals with the interaction between the lakes and the respondents which asks the respondents about the benefit they get from the lakes, what problem they observe, how many times they visit the lakes and the like. The second section deals with the respondents' attitude and perception about the new proposed lake protection plan and their willingness to pay for supporting the proposed plan. This part basically concerns with CVM question. Hypothetical market scenario was designed as one of the most basic component of the survey questionnaire based on the implementation of the proposed protection plan. In this section of the questionnaire to elicit respondents' WTP the single bound dichotomous choice question followed by open ended question.

The last section deals socio-economic and demographic characteristics of the respondent such as education level and age of the respondent, marital status, family size, average monthly income and the like were stated. Those respondents who have been interviewed in the pilot survey were not included in the final survey; the data was coded and prepared for analyses in appropriate ways and finally STATA software version 12 was employed to construct CVM models.

3.5 Methods of data analysis

The data obtained from CV study is analyzed using both descriptive statistics and econometrics model. First, descriptive statistics is used to analyze the socio-economic and demographic characteristics of the sampled respondents. This includes mean, median and standard deviation. Finally, in the study econometrics model, namely probit and Tobit models are estimated.

3.6 Econometric Model Specification

Analytical Model

CVM has its theoretical bases on **random utility theory** (RUT). This model specifies an indirect utility function for each respondent assuming that the representative respondents' gains utility from proposed protection program and the two possible levels of environmental quality involved are the status quo and a specific level of improvement. The basic model to analyze dichotomous responses based on the random utility theory was developed by

Hanemann in1984. The central theme of this theory is that although an individual knows his/her utility certainly, it has some components, which are unobservable from the view of the researcher. As a result, the researcher can only make probability statement about respondents' 'yes' or 'no' responses to the proposed scenario.

The indirect utility function for the jth respondent can be specified as follows:

$U_{ij}=U_i (Y_j, X_j, \varepsilon_{ij})$…… (1)

Where Y_j= jth respondent's income

i=1 denotes the final state and i=0 the status quo (or the initial state)

X_j= vector of socioeconomic and/or demographic factors

ε_{ij}= random component of the given indirect utility

If a payment (also called the bid, t) is introduced due to changes in measurable attributes like quality or quantity of environmental goods, the consumer accepts the proposed bid only if

$U_{1j} (Y_j - t, X_j, \varepsilon 1j) > U_{0j} (Y_j, Xj, \varepsilon_{0j})$…….. (2)

For the researcher, however, the random components of preferences cannot be known and s/he can only make probability statement of 'yes' or 'no' responses. Thus, the probability that the respondent says' yes' is the probability that s/he thinks that s/he is better off in the proposed program. For individual j, the probability is:

$P (yes) = P [U_{1j} (Y_j - t, X_j, \varepsilon_{1j}) > U_{0j} (Y_j, X_j, \varepsilon_{0j})]$…… (3)

We assume that the individual understands the proposed change in the environmental good is capable of evaluating the effect of this change on his or her utility and considers the proposed bid level.

Econometric Model

Two econometric models estimation techniques were used, one of which was a Probit model to identify which factors are responsible for being willing or unwilling to pay for the protection of lake and Tobit model is used to identify factors that determining the maximum amount a respondents was WTP(MWTP) for the lake protection. In the study the respondents have been asked single bound close ended 'Yes' or 'No' questions followed by open-ended questions to elicit respondent willingness to pay for the protection of lakes. The advantage of single bound close ended format is that it is easy for the respondent to pick the price, but still

starting point bias may arise so large sample size can minimize the problem. Open-ended method also avoids starting point bias large number of non-response error but it faces with large number of zero responses and few small positive responses. In this study, the respondents were asked at first whether he/she is interested in the proposed program or not and paying the proposed price. The next question is for the person who is interested in the protection, and then what is the maximum amount that he/she would be WTP which was useful for the Tobit analysis.

3.6.1 The Probit Models

Probit model is used to identify factors that influence a respondent's WTP decision. The probit model can be defined as

$$Y_j^* = \beta' X_j + \varepsilon_j \text{----------(4)}$$

Where; β' is vector of parameters of the model, X_j is vector of explanatory variables and ε_j (the error term) and is assumed to have random normal distribution with mean zero and common variance δ^2 (Greene, 1993). Y_j^* = unobservable respondent actual WTP for the lakes protection program. Which is also named to be a latent variable, what we observe is a dummy variable WTP_j, which is defined as:

$$WTP_j = 1 \text{ if } Y^*{}_j > 0 \text{----------(5)}$$

$$WTP_j = 0, otherwise \text{----------(6)}$$

In this case the respondents are asked whether accepting the proposed price (starting price) and WTP to get the proposed program or not. The probability of a yes response or no response can be cast in terms of random utility maximization chosen by the respondent. It is clear from the random utility framework that the point of view of the researcher.

$$P(WTP_j = 1) = \Phi(\beta' X_j) \text{----------(7)}$$

$$P(WTP_j = 0) = 1 - \Phi(\beta' X_j) \text{----------(8)}$$

Finally, the expanded form of the probit model in this study is that:

For visitor of lake Babogaya

$$\Pr(\mathrm{WTP_j}=1)=\beta_0+\beta_1\mathrm{sex}+\beta_2\mathrm{age}+\beta_3\mathrm{Mstatus}+\beta_4\mathrm{Fsize}+\beta_5\mathrm{Educ}+\beta_6\mathrm{Income}+\beta_7\mathrm{occ}+\beta_8\mathrm{dist}+\beta_9\mathrm{Sub}+\beta_{10}\mathrm{Notrip}+\beta_{11}\mathrm{Tcostv}+\beta_{12}\mathrm{Fvcoming}+\beta_{13}\mathrm{bid}+\varepsilon_j \quad --(9)$$

For visitor of lake Kuriftu

$$\mathrm{Pro}(\mathrm{WTP_j}=1)=\beta_0+\beta_1\mathrm{sex}+\beta_2\mathrm{age}+\beta_3\mathrm{Mstatus}+\beta_4\mathrm{Fsize}+\beta_5\mathrm{Educ}+\beta_6\mathrm{Income}+\beta_7\mathrm{occ}+\beta_8\mathrm{dist}+\beta_9\mathrm{Psub}+\beta_{10}\mathrm{Notrip}+\beta_{11}\mathrm{Tcostv}+\beta_{12}\mathrm{Fvcoming}+\varepsilon_j \quad --\quad ---------(10)$$

For resident response for lake Babogaya and lake Kuriftu are used the same model that is:

$$\mathrm{Pro}(\mathrm{WTP_j}=1)=\beta_0+\beta_1\mathrm{Sex}+\beta_2\mathrm{Age}+\beta_3\mathrm{Mstatus}+\beta_4\mathrm{Fsize}+\beta_5\mathrm{Educ}+\beta_6\mathrm{Income}+\beta_7\mathrm{Occup}+\beta_8\mathrm{Psub}+\beta_9\mathrm{Jopopp}+\beta_{10}\mathrm{HHmwork}+\beta_{11}\mathrm{Dis}+\varepsilon_j \quad --\quad ---------(11)$$

3.6.2 The Tobit Model

Tobit econometric model is used to analyze the determinants of WTP and the maximum amount of money that individuals are willing to pay. This model has an advantage over other discrete choice models (Linear probability model, Probit, and logistic) in that, it reveals both the probability of willingness to pay and the maximum WTP of the respondents.

Let MWTP be a latent variable which is not observed when it is less than or equal to zero but is observed if it is greater than zero. Following Maddala (1983), the Tobit model for observed MWTP is given by

$$MWTP_j=\alpha+\beta' X_j+\varepsilon_j \quad \text{If} \quad WTP>0, \quad ----------(12)$$

$$=0, otherwise \quad ----------(13)$$

Where MWTP is the unobserved maximum willingness to pay for individual j is censored, α is the intercept term, β vector of coefficients, X_j vector of independent variables and ε_j is the disturbance term which is independently and normally distributed with mean zero and common variance δ^2 with $\varepsilon_j \sim N(0, \delta^2)$ and; $MWTP_j$ is a latent variable corresponding to MWTP. Remember that a value of MWTP is observed when it is greater than zero.

Therefore, for the Tobit model the expanded form will be

For visitor of lake Babogaya

$$MWTP_j = \beta_0 + \beta_1 sex + \beta_2 age + \beta_3 Mstatus + \beta_4 Fsize + \beta_5 Educ + \beta_6 Income + \beta_7 occ + \beta_8 dist + \beta_9 Psub + \beta_{10} Notrip + \beta_{11} Tcostv + \beta_{12} Fvcoming + \beta_{13} bid + \varepsilon_j \quad ---(14)$$

For lake Kuriftu respondents (visitors)

$$MWTP_j = \beta_0 + \beta_1 sex + \beta_2 age + \beta_3 Mstatus + \beta_4 Fsize + \beta_5 Educ + \beta_6 Income + \beta_7 occ + \beta_8 dist + \beta_9 Psub + \beta_{10} Notrip + \beta_{11} Tcostv + \beta_{12} Fvcoming + \varepsilon_j \quad ---------(15)$$

For resident response for lake Kuriftu and lake Babogaya the same Tobit model are used that is:

$$MWTP_j = \beta_0 + \beta_1 Sex + \beta_2 Age + \beta_3 Mstatus + \beta_4 Fsize + \beta_5 Educ + \beta_6 Income + \beta_7 Occup + \beta_8 Psub + \beta_9 Jopopp + \beta_{10} HHmwork + \beta_{11} Dis + \varepsilon_j \quad -------(16)$$

For the open ended contingent valuation survey responses the maximum willingness to pay figures reported by the respondents can be simply be averaged to produce an estimate of mean willingness to pay:

Mean WTP=$\frac{\sum_i^n yi}{n}$ ..... (17)

Where n is the sample size and each y is a reported willingness to pay amount by surveyed respondents (Haab and McConnell, 2003).

Where; all the variables are as defined above

The total aggregate WTP estimates depend on both the benefits per person or household and the number of beneficiaries. The populations that accrue benefits from the proposed program are those residential that live in Bishoftu town.

$$Total\ \text{Re}venue = R \times M \quad \text{..... (18)}$$

Where; R is the mean/median amount of WTP and M is the total number of residential or housing units.

3.7 Description of Variables and Expected Sign

WTP: is dependent variable that indicates respondents' willingness to pay for the protection of lake. This variable is a dummy variable which takes the value of 1 if the respondent is willing to accept the initial price and 0 otherwise.

MWTP: is the Maximum willingness to pay that respondents will be asked to state their maximum willingness to pay for the protection of lake in Birr (open ended question). In this case, the dependent variable MWTP takes a continuous value and the researcher employed a censored regression model, i.e., the Tobit model.

Age (Age of Respondents): The expected sign of this variable is negative. This is because of aged respondent are eager to keep their tradition and they feel that since they will not be alive. Therefore they have less likely to support the proposed lake protection plan. It is expected that the younger generation will be more conscious about the proposed lake protection plan than the older one.

Sex (Sex of Respondents): Sex is a dummy variable taking 1 if the respondent is male; 0 otherwise. The relationship between sex of the respondent and his or her willingness to pay for lake protection depends on the attitude toward the economic value of lakes. Thus we can determine the sign of gender coefficient a prior and it is expected that males will have positive willingness to pay because they use recreational site than females.

Mstatus (Respondents Marital Status): This is a dummy variable taking 1 if the respondent is married; 0 otherwise. This variable is expected to have a positive sign since married People are more responsible than single, because they worried about the sustainability of lake resource for future generation than respondents who are single.

Fsize (Number of Household Members living together): There are two different arguments concerning the impact of family size on WTP. On one side when family size increase the demand for recreational place increase. They need to sustained lake resource for future generation. Thus a positive sign is expected. On the other side as family size increase the number of dependent family member increase. Here the monthly expenditure of the family is high that push the respondent to think WTP for lake protection as luxury. Even if, it seems negative those respondents also care too much for sustainability of resources for future generation. So, the study expected family size has positive effect on willingness to pay.

EDUCA (level of education for Respondent): this variable is designed to asses understanding of the respondents about the deterioration of lakes and its impact. The study expects that increase in education level will positively determines the WTP. So it is expected that people with higher level of education can understand the need for managing environmental resources and will be conscious to protect the lakes than others who are not well educated. This is categorical variable, in which 1 for primary (0-10 grade), 2 for preparatory level (certificate + preparatory), 3 for diploma level and 4 for degree and above. This category is made for simplicities of econometrics analysis.

Income (average monthly income of respondent): It is expected that as an average income of the respondents is high, they will have more WTP for the proposed protection plan. It is also expected that lakes' protection is a normal economic good in which the demand for increase with affluence. Thus, the expected sign of this variable is positive. Even if the respondent unit is individual in this study, the income of other family members have affects the respondent answer. In this case, if the expenditure share of the respondent in the family is high, it will affect the willingness to pay for proposed service negatively. However the expenditure share of the respondent is low (i.e. the other family member have high income) respondent WTP for lake protection expected to be positive. The positive income effect on respondents' WTP is an indicator that they have taken their budget constraint into consideration.

BID (bid amount): This refers to the starting price (amount of payment) that offer and paid by respondent. This is done to see if respondent responses are very much affected by the

starting value. It expected inversely related to WTP that is as the bid amount increase the willingness to pay of the respondent decline. beside this, for visitors 4 birr and 10 birr person per visit for lake Babogaya as amount of payment whereas for lake Kuriftu 10 birr person per visit. For the residents 15 birr per family per season for all residents whose required responses for lake Babogaya and lake Kuriftu.

Psubs (perception of respondent substitute by other lake): this refers to the possibility of getting other lake that provides the same recreational services and other same benefit to the respondent. If substitutions are high then people can easily switch their activity to another lake. Thus a negative sing is expected for WTP.

Dist (distance): this is a continuous variable. It is expected to be negative. This refers to the distance between the respondents' home up to the selected lakes. Respondent who live near to the lake expected that to be more aware about degradation in the lakes. Thus, as the distance (i.e. measure in kilo meters) of the lake from respondents' home decreases, the WTP of the respondent for proposed lake protection plan will be increase.

Occup (occupation of the respondent): this is a dummy variable 1 is specified for respondent who have a job whereas zero represent unemployed respondents'. Those individuals who have a job are expected positive WTP for proposed plan. This is due to a person who has a job will have income. When they earn money they will use recreational sites so they will have high WTP.

Job opp(job opportunity): this is consider as dummy variable which takes a value 1 if at least one of the members of the house hold get job opportunities in any recreational site of the selected lake which respondent asked, zero otherwise. Respondent or members of the household who get a job opportunity around recreational centre are expected to pay more for proposed lake protection plan. Thus, positive relationship is expected. This variable is applicable only for resident.

HHMWORKE (Number of household Members who have a job): this is continues variable. That is expected to influence WTP positively. As the number of members of household working any place increase income of the household would be higher and support the lake protection plan also expected to be high. This variable is used only for resident.

Notrip (number of trip that taken by visitor): this is continues variable. It expected that direct relationship between number of trip and WTP. This means as a number of trip increases respondent will have an awareness about the problem and the benefit of the lakes and they will have positive WTP. This is due to respondent give high value for the lake.

Fvcoming (Form of visitor coming): this is a dummy variable 1 is for visitor coming alone whereas zero for visitor coming in group. The visitor who comes alone is expected to have positive relationship with their willingness to pay. This is because of the payment vehicle of the study that show person per visit so paying for an individual is easier than paying for a group.

Tcostv (total cost for visit): this is continues variable. It is expected that this variable will affect the willingness to pay of visitors negatively. This is due to as total expenditure for visit recreation site increases their willingness to pay will decrease.

Table 3.1 Description of variables

Variables	Description	Variable type	measurement
Bid	Initial bid amount	Continuous	Birr
WTP	Willingness to pay for bid	Dummy	1= yes; 0= no
MWTP	Maximum willingness to pay	Continues	Birr
Age	Age of the respondent	Continues	Year
Sex	sex of the respondent	Dummy	1=male; 0= male
Mstatus	Respondent marital status	Dummy	1= married; 0= other wise
Fsize	Number of household living together	Continues	Number
EDU	Categories of level of education	Categorical	1= primary 2= preparatory 3=diploma 4=degree
Income	Average monthly income of the respondent	Continues	Birr
Psubs	Respondent perception for substitution	Dummy	1= easily substitution 0= other wise
Dist	Distance from respondents home to lake	Continues	Kilo meters
Occup	Occupation of the respondent	Dummy	1= have a job 0= have no job
Job opp*	Job opportunity of respondent at least one of the members of the house hold get job at any recreation site near to the lake	Dummy	1= if at least one of the members of the house hold get job opportunities
HHMWork*	House hold members who has a job any where	Continues	Number
Notrip**	Number of trip	Continues	Number
Fvcoming**	Form of visitor coming in this trip	Dummy	1= visitors come in alone;0= in group
Tcostv**	Total cost of visitor for this trip	Continues	Birr

Key:* represents the variable only for residents

** represents the variable only for visitors

Variables without star stands for both visitors and residents

Chapter Four: Results and Discussions

This chapter deals with the result and discussions of the data which is obtained from the contingent survey. It has two parts. The first part discuses about the descriptive analyses while the second part talks about multivariate econometric analysis.

4.1 Descriptive Analysis

4.1.1 Descriptive Analysis of residents

4.1.1.1 Socio–economic characteristics of residents

In relation to the sex ratio of the respondent, 51% and 49% are male and female for lake Babogaya while 56% and 44% are male and female respondents for lake Kuriftu. The average age of the respondents for lake Babogaya is 38.29 years with minimum age of 20 and maximum age of 65 years old. Similarly, the average age of lake Kuriftu respondents is 39.81 years with minimum 20 and maximum 72 years old. The average the family size for the sample respondents is 4.37 for each lake respondents. Another socio-economic characteristic is marital status. Here, 83% of the respondents of lake Babogaya and 78% of lake Kuriftu are married while the rest are single. Majority of the respondents were house head/ spouse. Here, 83% of lake Babogaya and 78% of lake Kuriftu were house hold heads.

With regard to education level of the respondents, 4% of Lake Babogaya and 7%of lake Kuriftu were illiterate. From the respondents, those who have achieved primary education are 16% for lake Babogaya and 18% for lake Kuriftu. Besides this, 21% of lake Babogaya respondents and 17% of lake Kuriftu acquired secondary level education and 21% of lake Babogaya and 22% of lake Kuriftu have completed preparatory and certificate level in any field of study. The rest 18% respondent of lake Babogaya and 19% respondent of lake Kuriftu are degree holders and 20% of lake Babogaya and 17% of lake Kuriftu have completed Diploma.

Table 4.1 Respondents in Different Education Category

	Lake Babogaya		Lake Kuriftu	
Educational categories	Freq.	Per.	Freq.	Per.
Illiterate	4	4	7	7
Primary	16	16	18	18
Secondary	21	21	17	17
Preparatory	16	16	15	15
Certificate	5	5	7	7
Diploma	20	20	17	17
Degree and above	18	18	19	19
Total	100	100	100	100

Source: Own survey result

With regard to their job, 86% and 82% of the respondent of lake Babogaya and lake Kuriftu respectively have a job. Among employed respondents of lake Babogaya, 30% are employed in private companies, 15% are government employees, 13% and 10% are trader and run their own private business respectively, 12% are farmer including fishing activity and the rest 6% are daily labourers. Beside this from lake Kuriftu employed respondent, 27% are government employees, 21% are employed in private companies, 14% are trader, and 16% run their own business while the rest 4% are daily labourers. The remaining 14% and 18% of them have no job due to being housewives, students, aged and disable.

Concerning the job opportunity of the respondents, 21% and 30% of the respondents at least one of their family member gets a job opportunity on the surrounding area of lake Babogaya and lake Kuriftu respectively on recreational site (i.e. under resort, Loadge and recreational centre) at different levels.

When we look at the job holder family members of lake Babogaya respondents, about 35% of the respondents responded that they have 1 family member who has a job anywhere. The rest 43%, 16% and 3% the respondents responded that 2, 3 and 4 of their family members respectively have any type of job at any place.

The remaining 3% of the respondents 5 of their family members have a job. The mean of family members who has a work for lake Babogaya is 1.96. Beside this from respondents of lake Kuriftu, 44% said that only 1 of their family members has a job whereas 39%,10%,4% and 3% had responded that 2 , 3 ,4 and 5 members of their family respectively have a job at any institutions. The mean of family numbers for the lake who has a job is 1.83.

The most difficult was the inquiry on the level of income the respondent earns. Most respondent were not interested to tell their monthly income while others do not know their average monthly income. In order to minimize this problem and to have the necessary data of their monthly average income, the study formulated different ranges of income as it has been shown in the following table. Then respondent were asked in which categories their income falls. The study used the midpoint of each income category as average monthly income of the respondent for econometrics analysis. From that the average monthly income of the respondent is 3119.5 birr for Lake Babogaya and 3331.5 birr for lake Kuriftu respondents. As it has been shown in Table 4.2, 32% for lake Babogaya and 39% for lake Kuriftu of the respondent's income is less than or equal to 1500.as the interviewees said that 45% of lake Babogaya and 41% of the lake Kuriftu interviewees' income is between 1501 to 4000 birr. The rest 21% and17% of the respondents for Lake Babogaya and lake Kuriftu respectively had income that ranges from 4001 to 10,000 birr. Only 2% of Lake Babogaya and 3% of lake Kuriftu respondents' income is more than 10,000 birr.

Table 4.2 Income Classification of Respondents

	For Lake Babogaya		For Lake Kuriftu	
Income group	Freq.	Per.	Freq.	Per.
<700	10	10	9	9
701-1500	22	22	30	30
1501-2500	30	30	23	23
2501-4000	15	15	18	18
4001-6000	10	10	12	12
6001-10000	11	11	5	5

10001-15000	1	1	1	1
15001-20000	0	0	0	0
20000-30000	1	1	0	0
30000-50000	0	0	2	2

Source: Own survey result

Another variable is the distance of the respondents. As the survey data shows, respondents of lake Babogaya are settled near to the lake. The average distance for the lake Babogaya is 2.1 km with the minimum distance of 0.1 km and a maximum of 6km. similarly; respondents of lake Kuriftu are also near to the lake and the average distance of 1.98km with minimum of 0.15km and a maximum of 5km.

4.1.1.2 Respondent attitude and perception

Before this study examines the attitude and the perception of the resident about the proposed project, respondents were asked about what benefit they have got from the lakes. The result shows that about 82% of respondents are direct beneficiaries from lake Babogaya. Among this, 52% of the respondents used for recreational purpose, 10% used for fishing purpose, 5% uses for washing cloth and drinking for cattle and only 2% used for farming. The rest 13% gets more than one benefit such as recreational benefit, job opportunity, fishing and substantial uses. The rest18% of Babogaya respondents does not get direct benefit from the lake.

From the respondents of lake Kuriftu, 65% are direct beneficiaries. Among the beneficiary respondents 38% used for recreational purpose, 6% used for watering their cattle and washing cloth, 6% used for fishing. The rest 15% got more than one benefit from the lake like for recreation, farming and fishing. From this, majority of respondent stated that they used in form of recreation with job opportunity, fishing, cattle drinking and for farming. Relatively Lake Babogaya has high benefit for community than Lake Kuriftu as showed from the survey result. It might be due to difference in the entrance fee. In addition to this there is variation in the number of recreational centres in which Babogaya has 7 recreational sites while Kuriftu has only one resort.

Respondent of lake Babogaya were also asked which problem they are observing around and in the place of the lakes. Here, 36% of the respondent identified a problem of water and surrounding area pollution, 10% and 9% of the respondent observe problem of endangerment for species and improper utilization of water. Another 19% of the respondents raised decrease in quality and quantity of water as a problem. The other 16% mentioned other problems like; sound pollution, snafu, problem related to boats transportation. Respondents who argued as there is no problem around the lake are 10%, and the rest 10% said that they do not concern about the problems.

On the other hand, in lake Kuriftu 27% of respondent stated that problem of amount of water decrease trough time (quantity reduction), about 9% raise the problem of pollution in part and surrounding area of the lake, 9% also have mentioned problem of endangerment for species in the lake and improper utilization of water. About 17% respondents observe more than one problem. Among this 17%, most of the respondents stated that problem of water quantity and quality reduction is severe than other problems which they listed. The rest 38% of the respondent have no idea about the problem around the lake. Here, even if some of respondent visit the lake, they are not conscious about the problem. On the other hand, majority of respondent do not visit the lake because of the expensiveness of entrance fee and they can say nothing about the problem around the lake.

With regard to the effort made so far by the municipality of the city for the activities to protect and conserve the lakes previously, 36% of lake Babogaya and 30% of lake Kruiftu respondents said it is poor. About 11% and 27% of lake Babogaya respondent said it was fair and good whereas12% and 18% of lake Kruiftu levelled fair and good respectively. Only 6% respondent of Babogaya and 8% of Kuriftu levelled very good effort. The remaining 17% respondent of Babogaya and 32% respondent of Kuriftu undecided due to lack of information about what activities were made by a city administration around the two lakes.

To assess attitude and perception of the respondent for proposed program, they were asked about their estimation of the lakes' sustainability or continuity without any conservation and protection programs. In this respect, the survey result shows that, 74% of Babogaya and 84% of Kuriftu respondent said it will be difficult for the lakes to sustain without any protection.

On the other hand, 21% of Babogaya and 10% of Kuriftu say it can be sustain even if there is no protection activates. The remaining 3% of Babogaya and 6% of Kuriftu respondent cannot decide. From this one can conclude that, the lakes need conservation. Respondent also asked about what they feel if new protection project will be formulated. For this question, almost all (95%) of each lake respondents highly interested about the proposed project. Only5% of the respondents responded that such type of project is not necessary for the lakes.

Respondents were also asked whom do they think is responsible to protect the lakes at city level. For this question, from respondents of Lake Babogaya around 6% and 12% of lake Kruiftu respondents said it is the responsibility of the municipality or city government. About 33% and 19% of lake Babogaya and Kuriftu respectively responded that it is community's responsibility. About 15% of Babogaya and 25% of Kuriftu respondent said owner of recreational centre and direct users of the lakes only. From respondent of lake Babogaya, 5% said both government and recreational user, and 41% said all government, community, visitors, and recreational centre owner are responsible. From the respondent of lake Kuriftu 6% of them said that it is the responsibility of both government and owner of recreation centre. The rest 35% think that all the government, communities, visitors and direct users of the lake are responsible whereas, only 3% said visitors are responsible.

Table 4.3 Responsible body

Resident	**lake Babogaya**	**lake Kruiftu**
	Per. (%)	**Per. (%)**
• Government	6	12
• Communities	33	19
• Visitors	0	3
• Owner of recreational centre& direct user communities	15	25
• Both government and owner of recreational Centre	5	6
• All listed in the above	41	35
Total	100	100

Source: own survey resul

Finally, respondent were also asked whether or not they support the proposed new project (i.e. will be done for lake protection of Babogaya and Kuriftu). According to the survey report 88% of the respondents of each the lakes are voluntary to support the proposed project whereas 12% are not willing to support.

4.1.1.3 Respondent WTP for proposed lake protection program

As mentioned in the methodology part, to elicit people's preference to lake protection single-bounded dichotomous choices with open-ended formats were adopted. The result shows that 80% had positive WTP for initial bid (i.e. 15 birr per season) for protection of lake Babogaya. Considering the entire sample, 47% of the respondents are males while the rest 33% are female. Similarly in Lake Kuriftu result showed that 81% had positive WTP for initial bid (i.e. 15 birr per season). From this, 52% of the respondents are males while the rest 29% are females. In both case greater proportion male respondents, it might be due to the reason that the males are more familiar for visiting recreational centres and since they are more beneficiaries and familiar to observe the problems, they are more willing to pay than female respondents. Most of a time there is a tradition and opportunity for males to visit and spent their leisure time in recreational place than female.

The mean WTP stated by respondent of lake Babogaya is 37.73 Birr per season, as the minimum of 0 birr and as a maximum 200 birr per season. On the other hand in lake Kuriftu result the mean WTP is 32.27 birr per season, as a minimum of 0 birr and as a maximum of 300 birr per season. As shown in table 4.4, 90% of the respondent of lake Babogaya and 88% of lake Kuriftu respondent gave the amount of WTP should be less than 50 birr per season where as 10% of the respondents of lake Babogaya stated value between 51-200 birr inclusively. Among 90% of respondent of lake Babogaya, 48% stated the MWTP between 0-25 birr per season whereas 42% give the WTP amount as a range of 26-50 birr per season. In lake Kuriftu among 88%, 63% amount of WTP as a range of 0-25 birr per season and 25% as a range of 26-50 birr per season. The rest12% of the respondent of lake Kuriftu gives a range 51-300 birr per season inclusively.

Table 4.4 Maximum WTP values stated by sample respondent

	lake Babogaya		lake Kuriftu	
Maximum WTP (birr)	Number	Pre.	Number	Pre.
0-25	48	48	63	63
26-50	42	42	25	25
51-75	5	5	2	2
76-100	9	9	7	7
101-125	0	0	0	0
126-150	1	1	1	1
151-175	0	0	0	0
176-200	1	1	1	1
201-300	0	0	1	1

Source: own survey result

Respondent were asked the reason behind their willingness to pay for the hypothetical lake protection program. The survey result shows that 28% of the respondent of each lakes are motivated to support the proposed lake protection project for the welfare of future generation (bequest motive). In order to sustain the direct use value of the lakes such as tourism, job opportunity, fishing and recreational activates 21% respondents of lake Babogaya and 12% of lake Kuriftu respondents are motivated to pay. In addition 9% of the respondent of lake Babogaya and 8% of lake Kuriftu respondent motivated to support for the sake of ecological benefit that is related to climate regulation and biological benefit of a lake (i.e. indirect use value motive). About 12% and 9% of the respondent of lake Babogaya and lake Kuriftu respectively motivated to support the proposed lake protection project even if they did not have any direct and indirect benefit from the lake they are motivated to pay for the existence of the lake (existence value motive). The rest 18% of the respondent of lake Babogaya had more than one motive. Out of this, 9% for both bequest value and direct use value motive. Another 6% are for both indirect use value and bequest value motive and the remaining 3% is

for both direct use value and bequest value motive. Similarly for lake Kuriftu respondents, 32 % have more than one motive. Out this 8% are motivated due to both for their proximity to the lake and for future generation benefit. The other 7% are motivated for the reason of both existence value and bequest value motive. The rest 17% have more than one motive but it is difficult to summarize since they have no reason in common.

The reason for zero willingness to pay

In this study 24 respondent among resident are not willing to pay for the proposed lake protection program and reveal zero WTP. Among these12 are respondent of lake Babogaya. From these 12 respondents, 5 respondents revealed that they did not have enough income to pay for proposed new lake protection program. About 3% disagree with proposed lake protection program and they said that the government should pay. The rest 4% reject proposed program because they think that they are not beneficiary and it is not their responsibility, rather it is responsibility of direct beneficiaries. Similarly, out of unwilling respondent of lake Kuriftu, 7% stated that it is the responsibility of the recreational centre owners and we are not responsible to protect the lake, 3% they have not enough income and 2% for the reason of they are not happy for the proposed program.

4.1.2 Descriptive analysis of visitors

4.1.2.1 Socio-Economic characteristic of visitors

The survey results of lake Kuriftu 55.34% were male respondent while 44.66% were female respondent. The average family size for the sample respondents is 4.38. Respondent age ranges from 18 to 54 years with an average of 32.92 years. The marital status shows that 70.87% of the respondents are married while the rest are not. Similarly the result of lake Babogaya show that from total 103 visitor, 67.96% of the respondent were male respondent while 32.04% were female respondent. The average family size is 3.78 with a minimum of 1 household members and a maximum of 12 household members. The average age is found to be 31.80 years with a minimum age of 16 years and maximum age of 64 years. According to the survey data about marital status of the respondents, 60.19% are married while the rest are not.

Respondents education category indicates that no illiterate respondent in both lakes. Here, 9.7% respondent of lake Babogaya and 3.88% of lake Kuriftu have attended primary level education and 17.47% respondents of lake Babogaya and 12.62% of lake Kuriftu respondent achieved secondary level education. Those who have completed preparatory and certificate level education are 25.24% for lake Babogaya and 20.39% for lake Kuriftu. The other 19.42% respondent of lake Babogaya and 17.48% respondent of lake Kuriftu completed their diploma. The rest 45.63% of lake Kuriftu and 28.16% of lake Babogaya respondents are degree and above holders.

Concerning with the employment, the survey result shows that 89.32% of Babogaya and 90.29% of lake Kuriftu respondent are employed while the rest 10.68% of lake Kuriftu and 9.71% of lake Babogaya are unemployed due to being housewives, students, aged and disable. In relation to the nature of employment, for lake Babogaya, 9% run their own business, 11% are trader, 32.7% are government employees, and 43 % are employed in private companies. Similarly in lake Kuriftu 3.88% are run their own business, 17.47% are trader, 14.56% are government employer and 49.51 are employed in the private companies.

Like that of the residents, most visitors were not keen to state their earnings. Therefore, in order to minimize those problems, similar technique which was used for residents has been employed which is categorizing respondents' income in different ranges. From these categories, midpoint of each income has been taken as the average monthly income of the respondents for the study. The survey result in the table 4.6 shows 41.75% for lake Babogaya and 22.33% for lake Kuriftu of the respondent's income is less than or equal to 2500. As the result shows, 23.3% of lake Babogaya and 32.04% of lake Kuriftu respondents' income falls within the range of 2501 to 4000 birr. In the same way, 27.19% and 35.92% for lake Babogaya and lake Kuriftu respondents' income ranges from 4001 to 10,000 birr. Respondents whose income exceeding 10,000 are 7.76% for lake Babogaya and 9.70% for lake Kuriftu.

Table 4.5 Income classification of respondents

	visitor of lake Babogaya		visitor of lake Kuriftu	
Income group	Freq.	Per.	Freq.	Per.
<1500	11	10.68	9	8.74
1501-2500	32	31.07	14	13.59
2501-4000	24	23.30	33	32.04
4001-6000	21	20.39	22	21.36
6001-10000	7	6.80	15	14.56
10001-15000	3	2.91	5	4.85
15001-20000	3	2.91	3	2.91
20000-30000	1	.97	1	.97
30000-50000	1	.97	1	.97

Source: own survey result

Another variable in relation with visitors is the number of trip that they have travelled to the lakes. The average number of trip for lake Babogaya is 3.68 time while for lake Kuriftu is 2.44 times. When we see the minimum and maximum number of trips for each lake, for lake Babogaya minimum of 1 and maximum of 30 where as for lake Kuriftu minimum of 1 and a maximum of 11with in this year. From Babogaya visitor 33(32.04%) of them visits the place for the first time while the rest visit the place at least for two times of this year. For lake Kuriftu, the result shows that 43(41.75%) of the respondent visit the place for the first time while 60(58.25%) respondent visit at least two times of this year.

Regarding to their coming, majority of the visitors for both lakes (i.e. 81(78.64%) of lake Babogaya and 73(70.87%) of lake Kuriftu visitors come to the lakes in group while the rest 22(21.36%) and 30(29.13%) of the respondent of lake Babogaya and lake Kruiftu came alone.

The result also shows that total expenditure of respondent for the trip (visiting time) the average amount of money for trip is1016 birr with a minimum of 350 and a maximum of 15,000 birr for lake Kuriftu. This variation in the amount of money is due to the numbers of day that the visitors stay in the recreational site. Which means 350 birr for a day and 15,000 birr is stay for 7 days. lake Babogaya result also shows an average total cost per visit is

492.5 birr with a minimum of 20 birr and a maximum of 3500 birr. As it can be seen, there is a wide difference in the amount of visiting cost of the two lakes. In lake Babogaya there is high chance or alternative recreational centre from lower cost entrance fee to high cost entrance fee. However, only one resort exists in the lake Kruiftu (i.e. Kuriftu resort and spa). Among Babogaya lake visitors 60(58.25%) of respondent incur a total cost of 350 birr inclusively while in Kuriftu resort only 2 (1.94%) respondent incur birr 350. From this we can conclude that without consideration of utility difference visitor have chances to visit lake Babogaya at lower cost than that of lake Kuriftu.

4.1.2.2Respondent perception and attitude

Respondent were also asked which problem they are observing around the lakes and within the lakes. Here, 33% of the respondent of lake Babogaya said that water quality reduction is the major problem of the lake whereas 34.95% respondent of lake Kuriftu mentioned amount of water reduction as a major problem. From lake Kuriftu respondents, 16.5% of them said that they are observing problem of water quality redaction, 8.73% respondent state endangerment of species, 3.88% states improper utilization of water. The 18.44% respondent stated more than one problem. Most of the 18.44% respondents identified the problem of level of water reduction as major problems of the lakes from other listed problem. Out of the rest 17.4% half of respondents expressed no problem in the area while the rest have no idea about the problems around the lake. Similarly, in lake Babogaya only 3.88% respondents identified water quantity reduction problem. Respondents who mentioned unwise usage of water as a problem are12.62% and 10.67% state endangerment for species. While the other 23.3% state by combining two or more problems. The rest 8.73% respondents stated problems which are unrelated to the lakes that basically focuses on rule and regulation recreational centre of the lakes, 3.88% say no problem while the remaining 3.79% have no idea about the problem around the lake.

To measure the attitudes of the community towards the sustainability of the lakes, respondents were asked a question which assesses whether it is possible to substitute the lakes if they are going to be dry out. For this question, 74.75% respondents of lake Babogaya perceive that it is difficult to substitute the benefit from the lake by any other lakes. The rest 23.3% respondents argued that it is possible to substitute the lake by any

other lakes. Similarly, 77.66% of lake Kuriftu respondents stated that, substituting the benefit from the lake by any other lakes is difficult whereas the rest 22.33% respondent stated that it is easy to substitute the lake by any other lake.

Another important variable is respondent attitude towards who is responsible to protect the lakes. In this respect, 65.04% and 72.81% of the respondent of lake Babogaya and lake Kuriftu respectively explained that all the government, owner of recreational site, the community and visitors are responsible to protect the lakes. For this issue, 11.65% respondents of each lake think that it is the responsibility of direct beneficiaries and owner of recreational centres. About 4.85% respondent of lake Babogaya and 5.82% of lake Kuriftu believe that it is the responsibility of the community. According to 3.88% and 2.19% respondents of lake Kuriftu respectively stated that visitors and the government are responsible bodies. The rest 2.19% respondent stated more than one body is responsible. Similarly for lake Babogaya 4.85% respondent and 8.73% respondents stated that government and community are responsible. The rest 8.73% sated more than one responsible body for lake protection.

For the question which was proposed to evaluate respondent's perception about the establishment of new protection program, 55.33% of lake Babogaya respondents and 68.93% respondents of lake Kuriftu said it is difficult to sustain the lakes without any protection program and it is a must to have new plan to protect the lakes. On the other hand, 20.38% of lake Babogaya and 8.73% of lake Kuriftu respondent respectively believes that lakes can be sustain even if there is no protection program where as 24.27% of lake Babogaya and 22.33% of lake Kuriftu respondent stated that it is difficult to estimate.

Respondent also asked about their perception about the proposed lake protection plan. According to their response, 95.14% respondents of lake Kuriftu and 92.23% respondents of Lake Babogaya argued that lake protection program is necessary and good whereas, 4.85% respondents of lake Kuriftu and 7.76% of lake Babogaya said it is not necessary to establish this kind of project for lake protection. Beside this, 85.43% of lake Babogaya and 81.55% of lake Kuriftu respondents are voluntarily to support the proposed lake protection program. The rest are not voluntary to support the protection program.

4.1.2.3 Respondent WTP for proposed lake protection program

In lake Kuriftu 76(73.78%) are willing to pay initial bid (i.e.10 birr person per visit) while the rest are not willing to pay. Similarly in the lake Babogaya result 83(80.58%) are willing to pay initial bid (i.e.4 birr and 10 birr person per visit for Babogaya recreational sites) whereas 20(19.41%) are not willing to pay. The mean WTP stated by respondent of lake Kuriftu is 30.09 Birr per person per visit, as the minimum of 0 birr and as a maximum 150 birr person per visit. Similarly in lake Babogaya the mean of MWTP is 30.93birr person per visit, as a minimum of 0 birr and a maximum of 200 birr. As shown in table 4.6 (which show the summary part of the open ended response), 61.16% of the respondent of lake Kuriftu and 66.99% respondent of lake Babogaya gave the WTP amount of 25 birr and less per person per visit. From Lake Kuriftu respondents, 25.24% and from lake Babogaya respondents 15.53% gave their WTP amount which ranges from 26-50 birr person per visit. The other 15.53% of lake Kuriftu and 17.47 % of lake Babogaya respondents stated their MWTP between 51-200 birr person per visit.

Table 4.6 Maximum WTP values stated by sample respondent (visitor)

	lake Babogaya		lake Kuriftu	
Maximum WTP (birr)	Number	Pre.	Number	Pre.
0-25	69	66.99	63	61.16
26-50	16	15.53	26	25.24
51-75	5	5	4	3.88
75-100	9	8.73	11	10.67
101-125	0	0	0	0
126-150	4	3.88	1	0.97
151-175	0	0	0	0
176-200	1	0.9	10	0

Source: Own survey result

Majority of respondent 36.89% of lake Kuriftu and 50.48% of lake Babogaya are willing to support the proposed program due to for future generation welfare (bequest motive). The 14.56% of lake Babogaya visitor and 15.53% of lake Kuriftu visitor are motivated to pay due to sustainability or continuities of Lake Resource and the benefit get. The 11.65% respondent for the reason of direct use value of lake related to benefit got through tourism or recreational value of lake Kuriftu. Approximately 11.65% respondent motivated due to the continuity of lake and for bequest value motive. The rest 7(6.7%) of respondents have more than one reason. Only 6 respondent are motive due to they lived near to the lake that help they used through indirect value of lake (i.e. through climate regulation).

In lake Babogaya 8.73% respondent are motivated due to the reason of direct use value of lake which is recreational value. The other 4.85% of the respondents are motivated due to they are a beneficiary from indirect use value of lake. This means the respondent live approximate of lake resource with this the lake resource have high benefit for attractiveness of the compound and it contribute a lot for climate regulation and biodiversity. The rest 3.88% and 2.91% are motivated due to for both continuity of lake resource and bequest value motive of lake resource.

The reason for zero WTP of the respondents (visitors)

Respondents have mentioned different reasons for their zero willingness to pay. For lake Babogaya a total of 15 respondents are not willing to pay. From these 15 respondents, 5(4.85%) are not willing without any reason, 3(2.91%) of them are not willing because they think that this is government responsibility and the rest 7(6.79%) respondents are not willing to pay due to they are not sure whether the collected money is properly expend to the project or not similarly, for lake Kuriftu, a total of 19 respondents are not willing to pay. Here, 6(5.82%) respondents are not willing since they think that this is the responsibility of the government, and other 6(5.82%) people have no reason for their unwillingness to pay. The rest 4 respondents are not willing due to them believe that it is recreational sites owners' responsibility and the remaining 3(2.91%) people are not willing to pay because they are not interested with the program.

Table 4.7: Summary of Description of Variables Used in the Analysis for lake Babogaya (residents)

Variables	**Mean**	**Std. Dev**	**Min.**	**Max.**
MWTP (in birr)	37.19	.37.73531	0	200
WTP	.8	.4020151	0	1
SEX	.51	.5024184	0	1
AGE	38.29	10.97407	20	65
Marriage	.83	.3775252	0	1
FSIZE	4.37	2.17727	1	10
EDU	2.15	1.14922	1	4
INCOME	3119.5	3285.113	350	25000
PSUBS	.17	.3775252	0	1
Occup	.86	.3487351	0	1
Job opp	25.99375	.4093620	0	1
HHMWORK	.19375	.9526147	0	5
DIST	2.1023	1.418262	.1	6

Source: survey result (2015)

Table 4.8: Summary of Description of Variables Used in the Analysis for lake Kuriftu (residents)

Variables	**Mean**	**Std. Dev**	**Min.**	**Max.**
MWTP (in birr)	32.47	42.53518	0	300
WTP	.81	.3942772	0	1
SEX	.56	.4988877	0	1
AGE	39.81	11.42892	20	72
Marriage	.78	.4163332	0	1
FSIZE	4.37	2.312264	1	11
EDU	2.13	1.160416	1	4
INCOME	3331.5	5672.803	350	40000
PSUBS	.31	.4648232	0	1
Occup	.82	.3861229	0	1
Job opp	.3	.4648232	0	1
HHMWORK	1.9861	1.451701	.15	5

DIST	1.83	.9749903	1	6

Source: survey result (2015)

Table 4.9: Summary of Description of Variables Used in the Analysis for lake Kuriftu visitors

Variables	**Mean**	**Std. Dev**	**Min.**	**Max.**
MWTP (in birr)	30.09709	.4419468	0	150
WTP	.7378641	32.21573	0	1
SEX	.5533981	.4995715	0	1
AGE	32.92233	7.811115	18	54
Marriage	.7087379	.45658	0	1
FSIZE	4.38835	2.105835	1	12
EDU	2.92233	1.15206	1	4
INCOME	5359.223	5319.529	0	40000
Dist	52.62136	37.30087	3	240
Notrip	2.446602	1.898029	1	11
Tcostv	1016.184	1510.887	350	15000
PSUBS	.223301	.4184949	0	1
Fvcoming	.2135922	.4118463	0	1
Occup	.8932039	.3103642	0	1

Source: survey result (2015)

Table 4.10: Summary of Description of Variables Used in the Analysis for lake Babogaya visitors

Variables	**Mean**	**Std. Dev**	**Min.**	**Max.**
MWTP (in birr)	30.93204	41.2513	0	200
WTP	.8058252	.3974984	0	1
SEX	.6796117	.4689076	0	1
AGE	31.80583	8.455255	16	64
Marriage	.6019417	.4918912	0	1
FSIZE	3.786408	2.194693	1	12
EDU	2.485437	1.17042	1	4

INCOME	4519.417	5303.381	750	40000
Dist	53.48544	85.74447	2	650
Notrip	3.68932	4.537489	1	30
Tcostv	492.5049	579.2957	20	3500
PSUBS	.2524272	.4365292	0	1
Fvcoming	.2912621	.4565658	0	1
Occup	.9029126	.2975245	0	1
Initial bid	6.15534	2.892713	4	10

Source: survey result (2015)

4.2 Econometric Model Result and Discussion

As described in the methodology part, to examine factors affecting WTP, multivariate econometric analysis was used. Since Multivariate analysis provides better information and clear focus on the factors that affect the WTP responses, it gives clue for policy implication or recommendation. In the econometric analysis, different socioeconomic, demographic and attitudinal variables are included to explain the dependent variables.

4.2.1 Results of the Probit Model for visitors

In the methodology part it was indicated that probit model is used to identify factors that influence a respondent's WTP decision for the protection of lake Kuriftu and lake Babogaya. In this model, the dependent variable assumes the value of 1 if a respondent is willing to pay the proposed initial bid amount and 0 otherwise.

Before running the econometric model estimation, data exploration for the pervasiveness of multi-co-linearity was tested since this problem reduces the accuracy of estimating the coefficient of variables having this problem. It is difficult to sort out the effects of each explanatory variable on the dependent variables. Multicollinearity is a serious problem if the correlation matrix is in excess of 0.8 (Gujirati, 1988). Thus the result indicates multicollinearity is not a serious problem in all case studies survey data. The maximum likelihood estimates for a respondent to be willing or not is corrected for potential

heteroscedasticity problem. As shown in table 4.8 The Wald chis square which are 55.53 shows the overall significance of the probit model at 1% level of significance for visitor of Kuriftu Lake. The pseudo R2 is 60.8%, which implies that percentage of the variation in the probability of being WTP or not is explained by the variables included in the model. And also Table 4.11 shows the Wald chis square are 46.35 the overall significance of the probit model at 1% level of significance for visitor of Lake Babogaya. The pseudo R2 is 44.47%. The model result along with respective significance values and its marginal effects are presented in table 4.11 and table 4.12 below:

Table 4.11 Probit Estimation Results for visitor of Lake Kuriftu

Explanatory Variables	Coeff.	Rob. Stan. Errs	P>/z/	Mar. (dF/dx)
Sex	.3934224	.4150692	0.343	.0222808
Age	-.0257997	.0298366	0.387	-.0013751
Mstatus	1.031201*	.5301553	0.052	.0905186
Fsize	-.0056566	.1076765	0.958	-.0003015
Income	.0001938*	.0001088	0.075	.0000103
Dist	-.0155089**	.0062126	0.013	-.0008266
Notrip	.2552034	.2083257	0.221	.0136023
Tcostv	.0010675***	.0003801	0.005	.0000596
Psubs	-1.917465***	.5368991	0.000	-.295076
Fvcoming	.4104565	.5267849	0.436	.0175836
Occup	.3320739	.6863359	0.629	.0230685
Preparatory	.2896424	.6704868	0.666	-.013179
Diploma	1.492991**	.7072462	0.035	.0398465
Degree	1.784577***	.6717739	0.008	.125392
_cons	-1.145002	1.151483	0.163	
pseudo R2	0.6080			

wald chi2	55.53	0.000	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Table 4.12 Probit Estimation Results for visitor of lake Babogaya

Explanatory Variables	Coeff.	Rob. Stan. Errs	P>/z/	Mar. (dF/dx)
Sex	.1348032	.4040197	0.739	.0083972
Age	-.0616766**	.0304945	0.043	-.0036581
Mstatus	.421547	.4894198	0.389	.0276955
Fsize	.1841938*	.1052996	0.080	-.0109248
Income	.0003504***	.0001257	0.005	.0000208
Dist	-.0068756***	.0018943	0.000	-.0004078
Notrip	.1297691	.0853498	0.128	.0076968
Tcostv	.0009414*	.000542	0.082	.0000558
Psubs	-.8327064**	.3785329	0.028	-.0764857
Fvcoming	.5611428	.4875969	0.250	.0274242
Occup	.156942	.7799656	0.841	.0105383
Initial bid	-.0819419	.0723602	0.257	-.0048601
Preparatory	.1716678	.499468	0.731	-.0093969
Diploma	1.451452**	.6989672	0.038	.0465018
Degree	.4325582	.5781688	0.454	.0217648
_cons	.6757006	1.151243	0.553	
pseudo R2	0.4447			
wald chi2	46.35		0.000	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Let us start first with the probit model results of visitors' of lake Kuriftu and lake Babogaya. There are some significant coefficients of variables in this model, as presented in Table 4.11 and Table 4.12.

Total cost for visiting was significantly affected WTP at 1% level of significance on lake Kuriftu visitors. In the lake Babogaya also significantly affects WTP at 10% level of significance. Unexpectedly, the impact of total cost for visiting on the willingness to pay is positive in both lake results. This might be because of a visitor who incur high cost were a person who has his/ her/ own high financial capacity. Looking at the marginal effects, keeping all other factors constant, a one birr increase in the total cost for visit of the respondents, increases the probability of the respondent willingness to pay for protection of Lake Kruiftu by 0.0059 percent or $5.96x10^5$ where as in Babogaya by 0.0058 percentages or $5.58x10^5$ percent.

Perception for substitution significantly affects at 1% and 5% level of significance with negative sign for lake Kuriftu and Lake Babogaya respectively. As expected this negative sign implied that when the respondent perceive the benefit get from Lake Kruiftu and Lake Babogaya can be easily substituted by any other lake, they are less likely to pay for lake protection. The marginal effect estimates show that when if the perception for substitution increases says by 1% the probability of the respondent willingness to pay for the protection of Lakes is decreases by 29.51 and 7.65 percentages for Kuriftu and lake Babogaya respectively.

Education level of the respondent affects the probability of willingness to pay positively. That is more educated respondents are more willing to pay for lake protection. To avoid a dummy variable trap the primary education groups were taken as control group, from the four categories of education level in the study. All the three education levels dummy show positive effect. In both lakes diploma dummy are significant at 5% level of significance whereas, degree dummy significant at 1% level of significance for Lake Kruiftu but, insignificant effects in Lake Babogaya.

Distance of the respondent from the home taken to the study area has negative sign and statistically significant at 5% and 1% level of significance for lake Kuriftu and lake

Babogaya respectively. The result shows that remaining other thing constant if the distance of the respondent increases says by one kilo meters, the probability of the respondent willingness to pay for the lakes protection reduces by 0.083 and 0.0407 percentages for lake Kuriftu and lake Babogaya respectively.

Income of the respondent has a positive sign and significant at 10% level of significant for lake Kuriftu where as 1% level of significant for lake Babogaya. The significance and positive sign of the variable income was consistent with economic theory. The result showed as income increases WTP for improved environmental resource also increases which is generally to be expected. Keeping all other factors constant at their respective mean, a one birr increase in the income of the respondent increases the probability of the respondent willingness to pay for protection of lake Kuriftu is increase by 0.001percentages or $1.03x10^5$ percent. Beside this respondent willingness to pay for protection of lake Babogaya increase by $2.08x10^5$ percent.

Marital status has a positive sign and significant at 10% significant level for lake Kuriftu whereas insignificant effects in Lake Babogaya with expected positive sign. It appears married respondents are more responsible for future generation and have higher WTP than the unmarried ones. Thus, married respondent are 9.05 percent more likely to be willing to pay for proposed lake protection of Kuriftu.

Age of the respondent has a negative sign in both lakes but difference in the level of significance. It has not significant effects in lake Kuriftu but, significant effects in lake Babogaya at 5% level of significance. The result shows that remaining other thing constant if age of respondent increases says by 1 year the probability of respondent WTP for the protection of Lake Babogaya decrease by 0.36 percentages. As expected age has negative relation with WTP. This might to be as age increases respondent attention for environmental resource conservation is decrees related to carelessness for remaining few year.

Family size of respondent was significant variable at 10% level of significant for Babogaya Lake. It has positive sign in Lake Babogaya. Looking at the marginal effect, keeping other factors constant, as family size increases by 1 person, increase respondent probability of willing to pay the initial bid for lake protection by 1.09%. Our hypothesis was that increase

in family size would have a positive relation with WTP. Even if increase in the family size increases the burden of providing food and other necessities of the family, they care too much for sustainability of environmental resource for future generations. So, respondents' family size demanded protection of lake for future use of the family member. However, variation on family size has no significant effect on the decision of WTP for lake Kuriftu, with unexpected negative sign.

The variables sex, number of trip, form of visitor coming; occupation and preparatory educational categories of the respondent have no significant impact on the WTP for both lakes protection. Those explanatory variables were not influencing the WTP decision of the Lakes but they are in line with the expected sign. The variables which have individual insignificant influence to WTP may have significant impact together with the significant variables.

4.2.2Tobit model result of visitors

As indicated in the methodology section, Tobit model is used to estimate the coefficients of explanatory variables for the open-ended questions to analyze factors that affect respondents' maximum willingness to pay for protection of lake Kuriftu and lake Babogaya. The overall model goodness of fit is represented by pseudo R^2 in the model (pseudo R^2 = 0.1154.) of lake Kruiftu and pseudo R^2= 0.0548 of lake Babogaya, which indicates that the fitted model has the power to explain the dependent variable. The result of Tobit model is presented in as follows.

Table 4.13Tobit Model Estimation Results of visitor of Kuriftu

Explanatory variables	Coef.	Std. Err.	P>|t|	Marg. Effect(dF/dx)
Sex	5.489978	4.96913	0.272	.0004689
Age	-.1214326	.4106628	0.768	.0079245
Mstatus	-5.51245	.6.460946	0.396	-.0569054

Fsize	1.337944	1.373793	0.333	.0613875
Income	.0026006***	.0005104	0.000	.0023201
Dist	-.0539964	.0689625	0.436	.0000558
Notrip	6.56274***	1.378183	0.000	.0384636
Tcostv	.003485**	.0016079	0.033	.0019414
Psubis	-25.58183***	6.490679	0.000	-.0122797
Fvcame	-8.755015	6.199322	0.161	-.0016413
Occup	1.468186	9.029384	0.871	-.0295721
Preparatory	.5538214	9.323106	0.953	.0094153
Diploma	19.34179**	9.439863	0.043	.051387
Degree	10.6037	8.805579	0.232	-.0409811
_cons	-15.68301	15.77157	0.323	
pseudo R2	0.1154			
LR chi2 (15)	102.05		0.000	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Table 4.14 Tobit Model Estimation Results of visitor of lake Babogaya

Explanatory variables	Coef.	Std. Err.	P>|t|	Marg. Effect(dF/dx)
Sex	3.247403	8.872993	0.715	.0280881
Age	-.6636781	.622127	0.294	.0056787
Marriage	10.93197	9.7402	0.265	.0953042
Fsize	1.637768	1.92729	0.398	.0140134

Income	.0013433*	.0007868	0.091	.0000115
Dist	-.1670504***	.0553457	0.003	.0014293
Notrip	-.8729261	.896337	0.333	.0074691
Tcostv	.0131673*	.0073533	0.077	.0001127
Psubs	-16.23924*	9.55084	0.093	.1483107
Fvcoming	14.83653*	8.817488	0.096	.1189246
Occup	17.63987	15.17144	0.248	.1683716
bid	-5.818716***	1.711191	0.001	-.0497872
Preparatory	17.39852	11.29873	0.127	.1357547
Diploma	29.05402**	12.15038	0.019	.2030823
Degree	44.36448***	12.37418	0.001	.302761
_cons	28.3504	24.02193	0.323	
pseudo R2	0.0548			
LR chi2 (15)	51.77		0.000	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

The respondents' net income variable had a positive sign and it significant at 1% and 10% level of significance for lake Kuriftu and lake Babogaya respectively. The marginal effect shows that, keeping other things constant, an increase the income of the visitors' by one birr would increase the maximum willingness to pay $2.33*10^5$ birr and $1.15*10^5$ birr person per visit for lake Kuriftu and lake Babogaya respectively. The positive sign indicates that, the individuals whose incomes are high would be MWTP more for the lake protection.

Total cost for visiting significantly affects the maximum willingness to pay (MWTP) at 5% and 10% level of significance for lake Kuriftu and lake Babogaya respectively. This variable has positive sign on both lakes. The result show unexpected sign on MWTP the same as

probit model result. The positive sign indicates that visitors who earn high income would expend high cost for recreation is expected to have high WTP for protection of lakes. The finding of the Tobit model showed that a one birr increment in visitors' total cost for visiting raises the MWTP by $1.94*10^5$ birr and $1.12*10^5$ birr person per visitor for Lake Kruiftu and Lake Babogaya respectively keeping other things held constant.

Perception for substitution significantly affects the maximum willingness to pay (MWTP) in lake Kuriftu at 5% and lake Babogaya at 10% level of significance with negative sign in both Lakes. If the visitor perceives easily substitution of one lake by any another, they are not willing to pay for new protection project and also the amount the visitor being WTP is smaller in line with the expected positive sign. The result of Tobit model shows that other thing remain constant if the perception for substitution increases by 1 %, the probability of the respondent MWTP for the protection of Lakes decreases by 1.22 and 14.83 percent for lake Kuriftu and lake Babogaya respectively.

The other variable, which has highly significant at 1% level of significance, was number of trip in lake Kuriftu maximum willingness to pay with positive sign. However, this variable has no significant in the result of lake Babogaya on the maximum willingness to pay with negative sign. The sign of this variable on the lake Kuriftu has different from result of lake Babogaya. This might be due to the difference in the mean of number of trip in two lakes (i.e. 2.446 for lake Kuriftu and 3.7 for lake Babogaya). If the number of a trip increases it is expansive to pay for visitor for each visiting time, it will affect the MWTP negatively. If the numbers of trip are small in number, it will be easy to pay additional payment for persons per visit for the sake of protection that positively affect the MWTP for lake Kuriftu.

Education level of respondent has expected positively affect the maximum willingness to pay (MWTP) since highly educated respondents have high understanding and knowledge about environmental conservation and since they have high income than that of lower educated respondents, they are highly willing to pay for the proposed project. All education dummy are show positive sign in both lakes. Tobit result of lake Kuriftu showed that only diploma dummy has significant effect on the MWTP. Beside this in the result of Tobit model for lake Babogaya diploma, and degree level are significant at 1% level of significance. The regression result indicated that the probability of the visitors' progress from being primary to

diploma increases the probability of MWTP by 12.31% and 20.3% for lake Kuriftu and for lake Babogaya respectively holding all other factors constant. In addition to this the probability of the visitor change from being primary to degree increases the probability of MWTP by 30.27% for lake Babogaya holding all other factors constant.

Form of visitor coming has significant at 10% level of significance with expected positive sign on the amount WTP for lake Babogaya. This variable has not significant effect on amount of WTP for Lake Kruiftu with expected positive sing. The result showed that a visitor who came alone is motivated to pay high MWTP than visitor came in group. This is due to the payment vehicle of the proposed lake protection program are for each person per each visiting time (person per visit). So, if they came in group the additional payment are costing than a person came alone. The result of Tobit model showed that other thing remain constant if the probability of visitor came alone increases by 1 % the probability of the respondent MWTP for the protection of Lake Babogaya are increases by 11.89%.

Distance has significant effects on the maximum willingness to pay (MWTP) at 1% level of significance with expected negative sign for lake Babogaya. But it has not significant on Tobit model for lake Kuriftu. The result shows that remaining other thing constant if the distance of the respondent increases let us say by one kilo meters, the probability of the respondent willingness to pay amount for protection of Lake Babogaya reduces by 0.14 birr.

Initial bid has significant at 1% level of significance on the result of Tobit model for lake Babogaya. As expected it has negative sign. Initial bid were constant in lake Kuriftu not take as explanatory variable. As initial bid increase the amount of willingness to pay of respondent are decrease. Thus, if the initial bid increase by 1 birr the probability of the respondent WTP amount decreased by 4.97% keeping all other variables held constant.

4.2.3 Probit model results of residents

Let us start first with the probit model results of resident of Bishoftu. There are some significant coefficients of variables in this model in both cases. As presented in table 4.15 and table 4.16 variable that are significantly related to WTP values are sex, perception for substation, income and diploma level of education.

Table 4.15 Probit Estimation Results of resident for Lake Kuriftu

Explanatory Variables	Coeff.	Rob. Stan. Errs	P>/z/	Mar. (dF/dx)
Sex	1.919344***	.6323079	0.002	.0445184
Age	.0026688	.0243192	0.913	.0000227
Marriage	.5869042	.6046515	0.332	.0084311
Fsize	.2371051	.1465292	0.106	.0020192
Income	.0005724**	.0002831	0.043	.4.87e-06
Psubis	-2.29903***	.4457024	0.000	-.1174041
Occup	1.094924**	.5449164	0.045	.0288483
JopOpp	.6893251	.6203714	0.267	.0288483
HHMWork	-.1120672	.2978598	0.707	-.0009544
Dist	-.1953329	.1692673	0.249	-.0016635
Preparatory	-.390706	.5162981	0.449	-.0047024
Diploma	1.643941**	.7913461	0.038	.0065901
Degree	.1480322	.6984209	0.832	.125392
_cons	-2.633251	1.04519	0.012	
pseudo R2	0.5323			
wald chi2	47.88		0.000	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Table 4.16 Probit Estimation Results of Resident Responses for Lake Babogaya

Explanatory Variables	Coeff.	Rob. Stan. Errs	P>/z/	Mar. (dF/dx)
Sex	.9224093*	.4766381	0.053	.0718057

Age	-.0378639*	.021747	0.082	-.0026731
Mstatus	.8374366*	.4817635	0.082	.0992406
Fsize	-.1237621	.130546	0.343	-.0087374
Income	.0002559*	.0001479	0.084	.0000181
Psubs	-1.857255***	.6297105	0.003	-.3599038
Occup	-.578825	.7046792	0.411	.0283708
Jopopp	.2868461	.5690541	0.614	.0174508
HHMWork	1.375027***	.4226767	0.001	.0970743
Dist	-.0831849	.1760486	0.637	-.0058727
Prep	.0992409	.5864116	0.866	.0066451
Diploma	1.181704**	.5210884	0.023	.0484472
Degree	.3796519	.6548383	0.562	.021755
_cons	-.1964005	1.192195	0.869	.0465018
pseudo R2	0.5597			
wald chi2	54.36		0.0000	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%

The variables sex has sign at 1% and 10% level of significance for lake Kuriftu and lake Babogaya respectively. The marginal effect reveals that, the probability of respondent being male increase the probability of WTP for lake Kuriftu by 4.45% and 7.18% for lake Babogaya keeping all other thing constant.

Monthly average income of the respondent has positive sign and statistically significant at 5% for lake Kuriftu and at 10% for lake Babogaya. The result show that remaining other thing constant if monthly income of the respondent increases by 1% the probability of respondent WTP increase by $4.87e^{-04}$% for lake Kuriftu and by 0.0018 % for lake Babogaya. The variable education levels are multi dummy variable as expected it has positive sign indicates that educated people has more WTP. But in both case study only diploma dummy categories of education has significant at 5% level of significant.

Perception for substitution is negative sign and statistically significant at 1% in both case .As hypothesized respondent whose perceive easily substitution of lake by any other lake have less WTP for protection. The marginal effects reveals that being respondent perceive easily substitution decrease the probability of saying yes by 11.7% and 35.99% for lake Kuriftu and for lake Babogaya respectively.

The variable occupation has positive sign and 5% level of significance in the result of lake Kuriftu. This variable has positive sign and not significant on lake Babogaya. As hypothesized, respondent who have a job have more WTP for lake protection than unemployed respondents. Thus, resident respondent are employed indicates they have their own income source than unemployed. So, we can expect they are more willing to pay than unemployed one. The marginal effects revels that respondent have a job will increase the probability of WTP by 2.88% while the other factors are held constant.

On the other hand some variables are significant only in lake Babogaya probit results. Those are: age, marriage, house hold member having a job. The variable age has negative sign and significant at 10% level of significance. As expected as negative sign implies as age increases the WTP for protection of environmental resource reduce. The marginal effects revels that, if the age of the respondent increases by 1 year, the probability of respondent WTP for protection of lake decreases by 0.267%. The variables marital status has positive a sign at 10% level of significance. As hypothesized, married people are more responsible for resource conservation and protection than the single ones. The marginal effect shows that, being married will increase the probability of saying yes in the initial bid by 9.92 percentages.

The variable household member have a job as expected more family member having a job increase the probability the household would be WTP for the protection of lakes significant at 1% level. The marginal effect shows that one additional member of the household getting a job ever where increase the probability of being WTP by 9.707%, other things held constant. Since the time spent in the work place is increase the demand of comfortable recreational place. Safe recreational place like protected lake are much choose able by visitor than polluted area in order to refresh mind.

4.2.4 Tobit model results of residents

The overall model goodness of fit is represented by pseudo R^2 in the model (pseudo R^2 = 0.1394) of lake Kuriftu respondent and (pseudo R2 = 0.0651) of lake Babogaya respondent. The results of Tobit model are presented in the table (i.e. Table 4.17 and Table 4.18) below:

Table 4.17Tobit Model Estimation Results of Resident Responses for Lake Kuriftu

Explanatory variables	Coef.	Std. Err.	P>|t|	Marg. Effect(dF/dx)
Sex	4.55326	5.861284	0.439	.0348792
Age	-.0074665	.2889829	0.979	-.0000563
Marriage	6.898305	7.574788	0.365	.0577896
Fsize	.8014227	1.499668	0.594	.0066408
Income	.0051163***	.0004612	0.000	.0000386
Psubis	-24.00492***	5.753803	0.000	-.23028
Occup	4.322011	7.692093	0.576	.0351465
JopOpp	12.30692**	5.1377824	0.025	.0813126
HHMWork	6.822493**	3.377076	0.046	.0514255
Dist	-1.974108	1.825341	0.282	-.0148801
Preparatory	7.732822	6.598956	0.244	.0514254
Diploma	10.6861	7.171341	0.140	.0664807
Degree	17.5916**	7.147958	0.016	.0970667
_cons	-13.49372	12.4634	0.282	

pseudo R2	0.1394		
LR chi2 (13)	132.17	0.0000	

*** Significant at 1%, ** Significant at 5%

Table 4.18 Tobit Model Estimation Results on Resident Response for Lake Babogaya

Explanatory variables	Coef.	Std. Err.	P>|t|	Marg. Effect(dF/dx)
Sex	8.096285	7.000718	0.251	.0576218
Age	.0785764	.4225355	0.853	.0005573
Marriage	12.35791	9.937227	0.217	.1003578
Fsize	1.687067	2.364975	0.478	.0119661
Income	.004121***	.0011186	0.000	.0000292
Psubis	-23.0349**	10.44311	0.030	-.2061677
Occup	19.72088	12.13867	0.108	.1744589
Jopopp	2.271835	8.449139	0.789	.015739
HHMWork	2.2231	4.496241	0.622	.015768
Dist	-5.611574**	2.44964	0.024	-.0398019
Prep	6.899609	8.986872	0.445	.0455231
Diploma	5.629113	9.775739	0.566	.0374879
Degree	10.74462	10.49449	0.309	.0674779
_cons	-14.44633	20.62782	0.486	
pseudo R2	0.0651			
LR chi2 (13)	60.48		0.000	

*** Significant at 1%, ** Significant at 5%

The variable income are is significant at 1% level of significance as expected in both case study tobit results which is consistent with economic theory that says income is positively related with demand in the case of normal goods. Even if the two Lakes are different by nature, monthly income of respondent are strongly affects the resident response on the actual maximum willingness to pay for protection of lakes. The marginal effects showed that other thing being held constant a one birr increases in the monthly income of the respondent raises WTP amount by 3.86*105 birr per season.

Perception for substitution of lakes has negative sign and statistically significant at 1% level of significance in both lakes. The finding of the tobit model shows that, respondent perceive for substitute of lake by other lake increases by 1% the probability of the respondent to MWTP for proposed project decreases by 23.02% and 20.61% for lake Kuriftu and lake Babogaya respectively. The same as probit model perception for substitution are a major determinate of the amount of the WTP.

The variable job opportunity for family members has positively sign and significant at 5% level of significance in the Tobit model result of lake Kuriftu. The result shows that the variable has no significant effects on lake Babogaya results with expected positive sign. Thus, if family members get a job opportunity in surrounding recreational centre of a lake, it has positive on the amount of WTP for protection of the lakes. Since, one of family members source of income determined by existing and sustainability of lake. The marginal effects show that other thing being constant when one household member gets a job opportunity the respondent WTP a mount rise by 0.813 birr per season.

The other variable which was found to be significant (5%) in the Tobit model is if the respondent has a job. It has a positive relationship with the actual amount that respondent would pay (WTP). The marginal effects showed that other thing being held constant when one household member engaged a job the household WTP amount rise by .051455 birr per season. Thus, the result of Tobit model for lake Babogaya are not significant but with expected positive sign.

Unlike the probit model result under education level of Kuriftu respondent categories, the variable degree dummy has positive and significant at 5% level of significance. This

variable has not significant result on the Tobit model for Babogaya Lake with expected positive sign. The positive sign indicates that as people get more educated their awareness for resource conservation are improved would also increase amount of WTP for protecting Lake. As education multi dummy changes from primary to degree the WTP amount increase by 0.097 birr per season, keeping all other variables held constant.

Contract to the probit result which was insignificant the variable distance has significant of (5%) impact on the amount that the respondent would be WTP. The same as probit model result it has negative sign. The result showed that if the distance of the respondent increase by one kilo meter, the probability of the respondent WTP amount for protection of lake Babogaya reduce by .039 birr per season. This variable is not significant on the result of lake Kuriftu on the amount of WTP.

Finally, the result of tobit model for lake Kuriftu the variable sex, age, marriage, family size, occupation, distance, preparatory and diploma level of education were not found significant in influencing the WTP amount for the proposed lakes protecting project. Whereas for lake Babogaya result of tobit model only three variables(i.e. income, substitution, distance) were significant impact on the MWTP for lake protection the remaining explanatory variables are not significant.

4.3 Estimating Aggregate Willingness to Pay and Total Revenue

In the previous section factors that are influential for WTP decision either to be the participant or not and the determinate of the maximum willingness to pay for the proposed lake protection plan of the respondents (i.e. visitors and residents) were discussed. In this section total WTP and the total revenue at various prices that resident of Bishoftu would be WTP is calculated. Since the data is collected from members of the family who can give the necessary information, a person who can represent the household can pay for the proposed lake protection plan. The aggregate benefit is obtained by combining residents' response of lake Kuriftu and lake Babogaya. According to Bishoftu culture and tourism bureau the population of Bishoftu town for the year 2014 was estimated to be 200,000 and the average family size of 4.37 per household which was obtained in the survey. Dividing the population

by average family size and after rounding a total of 45766.55 households is estimated to be found in the study area. To make aggregation over the whole household's class intervals for MWTP were used.

Table 4.19 Total WTP and Total Revenue from the for proposed lake protection project

Interval of MWTP **(a)**	Midpoint of MWTP **(b)**	Sample Distribution **(c)**		Total number of HH **(d)**	Total WTP **(e)=b*d**	Sam.hhs WTP at least that amount **(f)**		Minimum amount HHs are WTP **(g)**	Total revenue **(h)**
		No.	%			No.	%		
0-25	12.5	111	55.5	25400.45	317505.6	200	100	45766.55	572081.9
26-50	38	60	30	13729.97	521738.9	89	44.5	20366.11	773912.2
51-75	63	7	3.5	1601.83	100915.3	29	14.5	6636.14	418076.8
76-100	88	16	8	3661.32	322196.2	13	6.5	2974.82	261784.2
101-125	113	0	0	0	0	13	6.5	2974.82	336154.7
126-150	138	2	1	457.66	63157.08	11	5.5	2517.16	347368.1
151-175	163	0	0	0	0	11	5.5	2517.16	410297.1
176-200	188	3	1.5	686.49	129060.1	9	4.5	2059.49	387184.1
201-225	213	0	0	0	0	9	4.5	2059.49	438671.4
226-250	238	0	0	0	0	9	4.5	2059.49	490158.6
251-275	263	0	0	0	0	9	4.5	2059.49	541645.9
276-300	288	1	0.5	228.83	65903.04	8	4	1830.66	527230.1
Total		200	100	45766.55	1,520,476				5,504,565

Source: Survey result

The aggregate revenue that is expected from the proposed lakes protection plan as shown in Table 4.19 is calculated by multiplying the mid points of the WTP interval which is in column (b) by total number of households' WTP for the lake protection at least minimum amount which is column (g). The aggregate revenue expected from the proposed lake

protection given each household is willing to participate and pay for the improved service at least a minimum amount of column (g).

Taking the population of the sampled households that fall within the class boundary; we estimate the total number of households which is column (d); and column (e) which is the total WTP is obtained by multiplying column (b) midpoint value of the class boundary by column (d) total number of household that fall within the boundary. By summing up the total WTP amount of each class boundary, the grand total WTP (aggregate benefit) for proposed lake protection plan(i.e. for lake Babogaya and lake Kuriftu) is found to be 1,520,476 birr pre season or 6, 081,904 birr per annum.

As shown in Table 4.19 the predicted total number of households that are WTP at least that amount for the suggested lake protection plan at low price such as birr 38 it is larger (20,366 households) than at higher price say birr 188 which is only 5339.059 households. This is due to the expectation that at low price, such as 12.5, all households in Bishoftu can afford and participate for the proposed lake protection plan. This implies that there is a negative relationship between price and the total number of household that demand the newly proposed lake protection plan. So it is possible to derive the demand curve for the suggested newly proposed lake protection plan; where the vertical and horizontal axis represents the midpoint of the MWTP and the total households that are WTP at least that amount respectively.

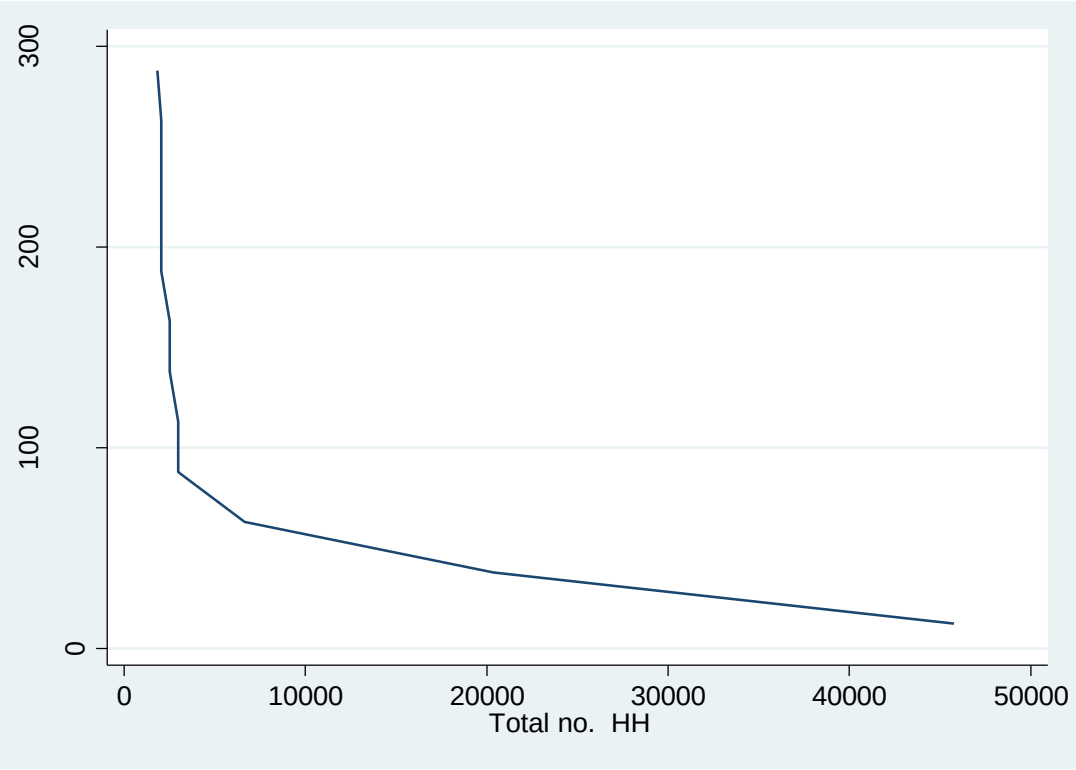

Fig. 1 The Estimated Household Demand curve for lakes protection

As the graph shows there is a discouragement effect of higher price on the demand for the proposed improvement, all others variables held constant. The result conforms to the general demand theory that price and quantity demanded have inverse relationship.

Column (h), i.e., the total revenue gained from the improved service is obtained simply by multiplying the total household's WTP at least that amount column (g) and class mark for WTP amount column (b). As we see from table 4.19 when price 12.5 birr 45766.55 households would pay for the suggested lakes protection plan and the aggregate total revenue is expected to be 572,081.9 birr per season. In general as price increase the total revenue generated increase, it reaches maximum and finally start to decline. This arises due to the reduction in the number of households that are WTP as price increase. The price level that makes the total revenue to be maximum (773912.2 birr) is 38 birr per season when the total number of household that are WTP at least at this price are 20366.11. Since birr 38, which is determined by the total revenue maximization criteria, is greater than the mean MWTP amount (i.e. 37.19 for lake Babogaya and 32.47 for lake Kuriftu on average of the two lakes

MWTP is 34.83). The information that is obtained in the table 4.16 about total revenue can also be represented graphically below.

Fig. 2 the Estimated Revenue Curve

Since there is no well organized secondary data in relation with the total population of domestic visitors of 2014/ 2015, it is impossible to calculate the aggregate benefit of the proposed lake protection plan.

Chapter Five: Conclusion and Recommendation

5.1 Conclusion

Protecting Lake Ecosystem is crucial not only to protect this country's public and economic health, but also to preserve and to restore the natural environment for all aquatic and terrestrial living things. Therefore, in order to protect the lakes, all users and non users of the community, government and recreational site owners and the like are responsible to conserve those resources. Even if protecting lakes are responsibility of different bodies, unfortunately in Bishoftu there is no a well organized program to protect the lakes. In order to formulate and implement a well organized programs that work on lake protection require capital out lay. In countries like Ethiopia, it is difficult to formulate this kind of programs. This is because the country gives high attention to fulfilled the basic need of the people rather than protect resources. Since the government of Ethiopia has faced financial problems to establish lake protection plans, this research attempts to show alternative sources of finance from visitors and residents in order to plan new lakes protection project.

In this study CVM technique were identified and properly applied to the study. The survey for the data collections administrated with appropriate questionnaire and face to face interview. The sample size, suitable elicitation techniques for CVM, the content of the questionnaire are fixed based on the direction from the pilot test. The CVM also was employed to elicit about willingness to pay of visitors and residents. Here, a single bounded dichotomous choice format with a follow up open-ended format was used. After the elicitation, comparison of the results obtained from these elicitation formats is made.

For data analysis both descriptive and econometric techniques were used. Two econometric models were estimated. Probit to estimate the probability of WTP for the proposed lake protection plan as a function of some independent variables and Tobit model identify factors that affect the amount of money respondents spends on lake protection plan WTP and to estimate mean MWTP. The mean willingness to pay value estimated from open-ended format (Tobit model) result for all case studies. The mean MWTP of lake Kuriftu visitors are30.09 birr person per visit whereas the mean MWTP of lake Babogaya visitors results are 30.93 birr person per visit. Similarly, mean MWTP of residents' response for lake Kuriftu is

32.27 birr per season whereas 37.19 birr per season for lake Babogaya. The study also shows the aggregate benefit of the proposed lake protection plan of the residents of Bishoftu is found to be 1,520,476 birr per season and 6,081,904 birr per annum. These aggregate benefit shows by combining total 200 residents' response for lake Kuriftu and lake Babogaya. Thus, there is difference in the mean of MWTP of the two lakes it might be due to respondent stated different value for the lakes. Beside this if the proposed lake protection plan is implemented the government, recreational site, fisher man as well as the society will be the beneficiary.

The probit estimates in this study show that some variables to be significant ones in the decision of whether or not respondents are WTP for the proposed protection plan. These include marital status, income, distance, total cost for visiting time, perception for substitution and from educational categories diploma and degree are significant variable for lake Kuriftu visitors. The Tobit model result of lake Kuriftu visitors also shows income, number of trip, total cost for visit, Perception for substitution and diploma are significant variables. Similarly, the variable age, family size, income, distance, total cost for visit, perception for substation and diploma are significant in the probit result of lake Babogaya visitors. The other variable income, distance, total cost for visit, perception for substitution and form of visitors' coming, initial bid and from education categories diploma and degree are significant variables in the Tobit model result of lake Babogaya visitors.

The same as visitor resident response for lake Babogaya and lake Kuriftu analysis by using probit and tobit model. From these probit result of lake Kuriftu shows the variable sex, income, perception for substitution, occupation and diploma are significant variables whereas the tobit model result shows income, perception for substitution, job opportunity, household member who has a job and diploma dummy are significant variables. Similarly, in lake Babogaya the probit and tobit model result shows some of significant variables. These include, sex, age, marital status, income, perception for substitution, household member who has a job and diploma dummy are significant variables of probit model where as income, and perception for substitution and distance are significant variables on the Tobit model.

The outcome of the study indicates 81.55% of visitors and 88% of the resident response for lake Kuriftu indicates their willingness' to pay for proposed lake protection plan. Similarly,

as the survey indicates 85.43% of visitor respondents and 88 % of resident respondents are willing to pay for proposed lake Babogaya protection plan. Therefore, if the money is collected from residents of the town and the visitors properly, the lake protection plan could undertake by the concerned body.

5.2 Recommendations

Based on the findings of this study, the following policy implications are suggested.

- As the result of the study shows, there are different socio-economic variable that affect the proposed lake protection plan. So, the project planners should take in to consideration those significant variables that affect respondents WTP and MWTP responses separately for lake Babogaya and for lake Kuriftu.
- The result of lake Kuriftu residents show that there is the positive relationship between income, occupation, household member who has a work and education level revels that effort toward improving residents income, being employed and education will increase WTP responses. In addition lake protection activity can further empower males because they are found more willing to pay than that of female. And also the concerned body give an attention for the variable total cost for visit, perception for substitution, education level and distance and number of trip of the respondents of lake Kuriftu visitors.
- The result of Lake Babogaya residents show consider more the effect of household member who has work, perception for substitution and diploma level. In addition age, sex, income and marital status also have it is own effect on the respondent WTP responses. Similarly, lake Babogaya visitors willingness to pay response high affected by income, bid and distance of the respondent. So, give some degree of attention for those variables depend on the level of significance.
- In a both lake Babogaya and Lake Kuriftu residents are strongly significant by perception for substitution and it has negative impact on WTP and MWTP. So, consider the effect of this variable because it need grate care otherwise it lead the respondent to be unwilling for the protection.

- As a result of the study shows visitors are part of the lake protection plan and they are willing to pay for the lakes protection plan in addition to the entrance fee. Therefore, with the collaboration of recreational site owner and government are responsible to adjust away to collect the money from visitors.
- According to the information from respondents, different problems like water quality and quantity reduction are observed around the lakes as major problems. So, an integrated party from government, recreational cites owners and communities should be organized to identify and solve the problems.
- Finally, researchers and project designers should pay attention for the lake Babogaya and lake Kuriftu for farther study and a new similar study on other lakes of Bishoftu. They should play their own role by conducting consecutive researches and by designing acceptable projects.

References

Aaron J. Douglas *and* David A.(2009). *Estimates of Recreation Benefits. U.S. Geological Survey. U.S. Bureau of Reclamation, USA.*

Abramovitz, J N (1996). Imperiled Waters, Impoverished Future: *The decline Of freshwater ecosystems*. World watch Paper number 128, World Watch Institute, Washington DC

Amene Daba (2014). *Economic valuation of the recreational use value of lake Babogaya*. Addis Ababa University MSC thesis.

Ayres, W., A. Busia, A. Dinar, R. Hirji, S. Lintner, A. McCalla, and R. Robelus(1996) *Integrated lake and reservoir management*. World Bank approach and experience.

Bateman, J. and Turner, K, (1997) Valuation of the Environment, Methods and Technique: *The Contingent Valuation Method.* Environmental Economics and Management

Bochstael, Naney and Freeman, M. (2005). *Welfare Theory and Valuation* The hand Book Environmental change in North Holland

Costanza R., Fisher B., Mulder K., Liu S. and Christopher, T. (2007). *Biodiversity and Ecosystem services*: a multi-scale empirical study of the relationship between Species richness and net primary production Ecological Economics, 61

Duker L. and Borre L.(2001). *Biodiversity conservation of the world's Lakes: A preliminary Frame work for identifying priorities. Annapolis, Mary land 21403 USA*

Form for environment (2007) *Harassing the water resource of Ethiopia for sustainable development in the new millennium.* In Abebe Amehha (ed.) Addis Ababa: forum for environment.

Freeman M. (1993), *Measurement of Environmental and Resource Values Theory and Methods*. Washington.

French, H. 2000. Vanishing borders: *protecting the planet in the age of globalization*. World

watch Institute. Washington, DC. Bank Technical Paper No. 358

Greene, W.H, (1993). *Econometric Analysis*. New York, Macmillan Publishing Company

Grey, D.; Sadoff, C. (2006). *Water for growth and development*. A theme documents the 4th World Water Forum. Mexico City, Mexico.

Gujja, B and M Perrin (1999). *A Place for Dames in the 21st Century?* WWF International land, Switzerland

Gujirati D., (1998). *Basic Econometrics:* 2nd edition. New York McGraw Hill international Edition: economics series.

Haab, T.C. and K.E. McConnell (2002) *Valuing environmental and natural resources: the econometrics of non-market valuation*. Cheltenham: Edward Elgar.

Halkos. G and Matsiori. S,(2012).*Assessing the economic value of protecting the Artificial Lakes*. University of Thessaly, Volos Greece

Hanley, N. F. Shogren, Janson and B. White (1997). *Environmental economics in theory And practices*. Macmillan press limited, London

Haymanot Legesse(2007). *The value of water quality improvement on Lake Hora Arsede*. Ethiopia. M. Sc Thesis, department t of Economics, Addis Ababa University

Imandoust, S. B. and S. N. Gadam, S.N***(2007).*** *Are people willing to pay for river water quality, contingent valuation.* Department of Economics payam Noor university India, Penu India.

Jalaa, L.N and agirib (2015). *Evaluation of Economic Value of Pilikula Lake using Travel Cost and Contingent Valuation Methods*. *A DHI* water &environment *(*India*) pvt ltd,3rd floor NSIC-STP* complex, New *Delhi 110020, India*

Khalid Abdul (2008). *Contingent Valuation Method (CVM).* the Regional Training Workshop Economic Valuation of the Goods and Services of Coast Habitats. Samut Songkram

Province, Thailand

Lemly, D., Kingsford, R. and J. Thompson (2000). *Irrigated agriculture and wildlife conservation: conflict on a global scale*. Environmental Management 25(5):485-512

Maddala G.s(1983). *Limited Dependent and Qualitative Variables in Econometrics* New York, Cambridge University Press.

McCartney, M. P.; Awulachew, S (2006). *Improving dam planning and operation in the Nile Basin through the use of decision support systems*. Proceedings of the Nile Basin Development Forum, Addis Ababa, Ethiopia

Mitchell, R.C and Carson ,R.T.,(1989). *Using surveys to value public goods*: The Contingent valuation method. The John Hopkins University press Washington D.C.

Nallathiga and Paravastu, (2003). *Benefit estimation of River water Quality Conservation Using Contingent Valuation Survey*. A case study in Yamuna River Sub-basin" Mumbai, India.

Perman R., Ma Y, McGillivray J. and Common M.,(2003).*Natural Resource and Environmental Economics*. Edinburgh, Longman, 3rd edition

Philip Coopera,*, Gregory L. Poeb, Ian J. Batemanc. (2004). *The structure of motivation for contingent values*. Department of Applied Economics and Management,, University of Bath, USA.

Ramsar Bureau (1971). *Proceedings of the International Conference on Conservation of Wetlands And Waterfowl*, Ramsar, Iran, 30th January – 3rd February 1971. International Developmen Wildfowl Research Bureau, Slimbridge

Revenga, C., J. Brunner, N. Henninger, K. Kassem, and R. Payne (2000). *Pilot analysis of global ecosystems: freshwater systems. World Resources Institute*. Washington, DC.

Sattout E.J., Talhouk S.N. and Caligari P.D.S. (2007).*Economic value of cedar relics in Lebanon*: an application of contingent valuation method for conservation". Ecological Economics, 61

Scherl, LM (2005). *Protected Areas and Local and Indigenous Communities*. In McNeely, J.A. (ed.). Friends for life: New Partnerships in Support of Protected Areas, Gland, Switzerland

Schuyt, Kirsten and Luke Brander(2004) . *The economic values of the world's wetlands*. WWF. 2004.

Secretariat of the Convention on Biological Diversity (2008). *Protected Areas in Today's World*. Their Values and Benefits for the Welfare of the Planet. Montreal, Technical Series no. 36

Shiklomanov, I. (1993). *World fresh water resources.* In P.H. Gleick (ed.), Water in Crisis: A guide to the world's fresh water resources. Oxford University Press, New York.

Terefe, F(2000); "Measuring Economic Value of Tis Abay Waterfalls Comparisons of CV and TC Methods". M. Sc thesis department of Economics, AAU.

Tsegaye Tagesse (2005) ,"the value of Lake improvement for fishermen of lake Chamo Ethiopia". M. Sc Thesis ,department t of Economics , Addis Ababa University

Turner R.K., van den Bergh M., Soderqvist T., Barendregt A., van der Straaten J.(2000). *Ecological-Economic Analysis of Wet lands*. Scientific integration for Management and Policy. Ecological Economics, 35

U.S. Environmental Protection Agency (USEPA, 2009). National Lakes Assessment: *A Collaborative Survey of the Nation's Lakes*. U.S. Environmental Protection Agency, Office of Water and Office of Research and Development, Washington, D.C.

Vorosmarty, C.J., Green, P., Salisbury, J., and Lammers, R.B. (2000). *Global water resources: Vulnerability form climate change and population growth.* Science 289:284-288.

Whittington, Dale (2002); "Improving the Performance of Contingent Valuation studies in Developing Countries". Environmental and Resource Economics, Kluwe Academic publishes printed in the Netherlands.

Whittington, D., Briscoe, J and Mu. (1987). *Willingness to pay for water in rural Areas*. methodological approaches and an application in Haiti." WASH field report

World Bank (2004). *The water resources sector strategy*. an overview". Washington, DC, USA

World Bank (1992); "World Development Report". Washington, D.C.

Yang W., Chang J., Xu B., Peng C. and Ge Y. (2008). *Ecosystem service value Assessment for*

constructed wetlands. A case study in Hangzhou, China." *Ecological Economics*, 68:116-125.

Yapping, D.(1997). *The value of improved water quality for recreational in East lake, Wuhan*. China: an application of contingent Valuation and Travel Cost Method", Ottawa, Canada

Yibeltal Tebikew (2009). *The Economics of Biodiversity Conservation in Ethiopia*: Valuing Local Benefits and Opportunity Costs of Conserving Abijata-Shalla Lakes National Park, Ethiopia."M. Sc University of Copenhagen, Faculty of Life Sciences

Zewdu Belete and Yemesrach Assefa (2001). *Willingness to pay for protecting Endangered environments*. The Case of Nechsar National Park

Zylicz.T.I. Bateman, S. Georgiou, A. Markowska, D. Dziegielewska, R. K. Turner, Graham and I. Langford (1995). *Contingent valuation of Eutrophication Damage in the Balitic Sea.* University of East Anglia Warsaw Ecological Centre

Annex 1

Summary of Description of Variables Used in the Analysis for lake Babogaya (residents)

```
. summarize mwtp wtp sex age mstatus fsize edu income psubs occu jobopp hhmwork dist
```

Variable	Obs	Mean	Std. Dev.	Min	Max
mwtp	100	37.19	37.73531	0	200
wtp	100	.8	.4020151	0	1
sex	100	.51	.5024184	0	1
age	100	38.29	10.97407	20	65
mstatus	100	.83	.3775252	0	1
fsize	100	4.37	2.17727	1	10
edu	100	2.15	1.14922	1	4
income	100	3119.5	3285.113	350	25000
psubs	100	.17	.3775252	0	1
occu	100	.86	.3487351	0	1
jobopp	100	.21	.4093602	0	1
hhmwork	100	1.96	.9526147	1	5
dist	100	2.1023	1.418262	.1	6

Annxe2

Summary of Description of Variables Used in the Analysis for lake Kuriftu (residents)

```
. summarize mwtp wtp sex age mstatus fsize edu income psub occ jobopp dis hhmwork
```

Variable	Obs	Mean	Std. Dev.	Min	Max
mwtp	100	32.47	42.53518	0	300
wtp	100	.81	.3942772	0	1
sex	100	.56	.4988877	0	1
age	100	39.81	11.42892	20	72
mstatus	100	.78	.4163332	0	1
fsize	100	4.37	2.312264	1	11
edu	100	2.13	1.160416	1	4
income	100	3331.5	5672.803	350	40000
psub	100	.31	.4648232	0	1
occ	100	.82	.3861229	0	1
jobopp	100	.3	.4605662	0	1
dis	100	1.9861	1.451701	.15	5
hhmwork	100	1.83	.9749903	1	5

Annex3

Summary of Description of Variables Used in the Analysis for lake Babogaya visitors

```
. summarize mwtp wtp sex age mstatus fsize edu income dist notrip tcostvi sub fvcame occu initi
> albid
```

Variable	Obs	Mean	Std. Dev.	Min	Max
mwtp	103	30.93204	41.25132	0	200
wtp	103	.8058252	.3974984	0	1
sex	103	.6796117	.4689076	0	1
age	103	31.80583	8.455255	16	64
mstatus	103	.6019417	.4918912	0	1
fsize	103	3.786408	2.194693	1	12
edu	103	2.485437	1.17042	1	4
income	103	4519.417	5303.381	0	40000
dist	103	53.48544	85.74447	2	650
notrip	103	3.68932	4.537489	1	30
tcostvi	103	492.5049	579.2957	20	3500
sub	103	.2524272	.4365292	0	1
fvcame	103	.2912621	.4565658	0	1
occu	103	.9029126	.2975245	0	1
initialbid	103	6.15534	2.892713	4	10

Annex 4

Summary of Description of Variables Used in the Analysis for lake Kuriftu visitors

```
. summarize mwtp wtp sexr ager mstatusr fsizer edur incomer disr notripr tcostvr psubistr fvcam
> e ocupr
```

Variable	Obs	Mean	Std. Dev.	Min	Max
mwtp	103	30.09709	32.21573	0	150
wtp	103	.7378641	.4419468	0	1
sexr	103	.5533981	.4995715	0	1
ager	103	32.92233	7.811115	18	54
mstatusr	103	.7087379	.4565658	0	1
fsizer	103	4.38835	2.165835	1	12
edur	103	2.92233	1.15206	1	4
incomer	103	5359.223	5319.529	750	40000
disr	103	52.62136	37.30087	3	240
notripr	103	2.446602	1.898029	1	11
tcostvr	103	1016.184	1510.887	350	15000
psubistr	103	.223301	.4184949	0	1
fvcame	103	.2135922	.4118463	0	1
ocupr	103	.8932039	.3103642	0	1

Annex 5

Correlation matrix among explanatory variables lake Babogaya (residents)

```
. pwcorr sex age mstatus fsize income psubs occu jobopp hhmwork dist prmsec prp diplm degmas
```

	sex	age	mstatus	fsize	income	psubs	occu
sex	1.0000						
age	0.0535	1.0000					
mstatus	-0.0708	0.3680	1.0000				
fsize	0.0197	0.5721	0.3599	1.0000			
income	0.1313	0.1594	0.1778	0.2772	1.0000		
psubs	-0.3020	-0.1242	-0.0078	-0.0527	-0.2768	1.0000	
occu	0.1810	-0.2823	0.0476	0.0423	0.1179	-0.2010	1.0000
jobopp	0.1616	0.0335	-0.0281	-0.0881	0.1359	-0.1680	0.2080
hhmwork	-0.0625	0.3519	0.2056	0.6306	0.1779	-0.0652	0.0742
dist	-0.0948	0.0376	-0.0059	0.0481	-0.0815	0.1266	0.0337
prmsec	-0.1184	-0.0482	0.0525	-0.0673	-0.3138	0.3805	-0.1324
prp	0.1616	0.0268	-0.0935	-0.0767	-0.0887	-0.1026	-0.0750
diplm	-0.0862	-0.0736	0.0156	-0.0004	0.1776	-0.1513	0.0485
degmas	0.0668	0.1062	0.0156	0.1644	0.3079	-0.2192	0.1954

	jobopp	hhmwork	dist	prmsec	prp	diplm	degmas
jobopp	1.0000						
hhmwork	-0.0300	1.0000					
dist	-0.1044	-0.0796	1.0000				
prmsec	-0.1303	-0.0506	0.2112	1.0000			
prp	0.1561	0.0477	-0.0212	-0.4298	1.0000		
diplm	0.0632	-0.0871	-0.0044	-0.4037	-0.2497	1.0000	
degmas	-0.0620	0.1011	-0.2383	-0.4037	-0.2497	-0.2346	1.0000

Annex 6

Correlation matrix among explanatory variables Lake Kuriftu (residents)

```
. pwcorr sex1 age1 mstatus fsize1 midincome sub occ jobopp hhmwork dis pri prp dip dema
```

	sex1	age1	mstatus	fsize1	midinc~e	sub	occ
sex1	1.0000						
age1	0.3519	1.0000					
mstatus	-0.0331	0.4645	1.0000				
fsize1	-0.0151	0.4197	0.4631	1.0000			
midincome	0.2141	0.1783	0.0573	0.1019	1.0000		
sub	0.0279	-0.0649	0.0428	0.0238	0.0196	1.0000	
occ	0.2139	-0.1497	-0.0603	-0.1849	0.1836	-0.0799	1.0000
jobopp	0.0528	0.0090	0.0843	0.0370	0.1400	-0.1085	0.0795
hhmwork	0.0316	0.3089	0.1807	0.5031	0.3323	-0.1723	0.2130
dis	-0.2247	0.1086	0.0893	0.1479	-0.0679	0.1659	-0.2388
pri	-0.1660	-0.0068	0.0224	0.0710	-0.1050	-0.1454	-0.2240
prp	0.0119	0.0561	0.0960	0.1625	-0.0688	0.0791	0.0498
dip	0.0482	-0.1432	-0.2539	-0.2564	-0.0229	0.0799	0.0163
dema	0.1531	0.0925	0.1232	-0.0075	0.2312	0.0236	0.2195

	jobopp	hhmwork	dis	pri	prp	dip	dema
jobopp	1.0000						
hhmwork	0.1147	1.0000					
dis	0.0376	0.0254	1.0000				
pri	-0.0397	-0.0977	0.0835	1.0000			
prp	-0.0696	0.0903	0.0950	-0.4478	1.0000		
dip	-0.0795	-0.0252	-0.0461	-0.4069	-0.2416	1.0000	
dema	0.2045	0.0553	-0.1622	-0.4069	-0.2416	-0.2195	1.0000

.

Annex 7

Correlation matrix among explanatory variables Lake Babogaya (Visitors)

```
. pwcorr sex age mstatus fsize income dist notrip tcostvi sub fvcame occu initialbid prisec cer
> prp diploma degmas
```

	sex	age	mstatus	fsize	income	dist	notrip
sex	1.0000						
age	-0.0801	1.0000					
mstatus	-0.0908	0.4998	1.0000				
fsize	0.0948	0.0220	-0.1522	1.0000			
income	0.0784	0.1804	-0.0506	0.0119	1.0000		
dist	0.0763	-0.0261	-0.0042	0.3315	0.0049	1.0000	
notrip	0.1878	-0.1000	-0.0384	-0.0323	-0.0821	-0.1708	1.0000
tcostvi	-0.0004	0.1509	0.0697	0.0692	0.2313	0.1265	-0.0505
sub	0.0158	0.0851	-0.0754	0.0057	-0.1609	-0.0214	-0.0887
fvcame	0.1196	0.0021	0.1284	0.0920	0.0078	0.2227	-0.0411
occu	0.1965	-0.1050	0.0013	0.1331	0.2233	0.0983	0.0065
initialbid	-0.2665	0.2097	0.1955	-0.2418	0.0634	-0.1477	-0.2039
prisec	0.0922	0.0504	-0.1718	-0.0202	-0.0291	-0.1331	-0.1223
cerprp	0.0637	-0.0371	0.0160	-0.0967	-0.1567	-0.0677	0.0004
diploma	-0.0837	-0.0908	-0.0019	0.0368	-0.0425	0.1206	0.0610
degmas	-0.0790	0.0658	0.1563	0.0810	0.2175	0.0911	0.0670

	tcostvi	sub	fvcame	occu	initia~d	prisec	cerprp
tcostvi	1.0000						
sub	-0.0845	1.0000					
fvcame	-0.0458	0.0210	1.0000				
occu	0.1576	-0.1114	0.0659	1.0000			
initialbid	0.3516	0.0308	-0.2128	0.0405	1.0000		
prisec	-0.2133	0.0971	-0.1035	-0.2419	-0.1846	1.0000	
cerprp	-0.0138	0.1768	-0.0282	0.0396	0.0308	-0.3551	1.0000
diploma	-0.1120	-0.1157	0.0094	-0.0048	-0.1118	-0.2999	-0.2852
degmas	0.3229	-0.1650	0.1213	0.2053	0.2512	-0.3825	-0.3638

	diploma	degmas
diploma	1.0000	
degmas	-0.3073	1.0000

Annex 8

Correlation matrix among explanatory variables Lake Kuriftu (Visitors)

```
. pwcorr sexr ager mstatusr fsizer incomer disr notripr tcostvr psubistr fvcame ocupr prisec ce
> rtprp diploma degreema
```

	sexr	ager	mstatusr	fsizer	incomer	disr	notripr
sexr	1.0000						
ager	0.1845	1.0000					
mstatusr	0.0259	0.5297	1.0000				
fsizer	0.0350	0.3310	0.2147	1.0000			
incomer	0.1181	0.0107	0.1303	-0.1482	1.0000		
disr	0.0698	-0.1492	-0.0779	-0.0513	-0.0150	1.0000	
notripr	-0.0151	0.1221	0.1629	0.2460	0.0536	-0.2196	1.0000
tcostvr	0.1280	0.0013	0.1120	-0.0537	0.3495	0.0246	0.0794
psubistr	0.0127	0.0084	-0.1694	-0.1723	-0.2423	0.1543	-0.0898
fvcame	0.0870	0.0936	-0.0830	0.2138	-0.0466	0.0768	0.2029
ocupr	0.0055	0.1543	0.1243	-0.2586	0.1393	-0.0569	0.1317
prisec	0.0474	0.1317	-0.0781	-0.1499	-0.1238	0.1189	-0.2292
certprp	0.1346	-0.0405	0.0734	0.0600	-0.2502	-0.0508	-0.1985
diploma	-0.1009	-0.0678	-0.0426	-0.0117	-0.1170	0.0384	-0.0141
degreema	-0.0653	-0.0028	0.0241	0.0593	0.3763	-0.0665	0.3257

	tcostvr	psubistr	fvcame	ocupr	prisec	certprp	diploma
tcostvr	1.0000						
psubistr	-0.0984	1.0000					
fvcame	-0.0421	-0.0519	1.0000				
ocupr	0.0450	-0.0410	-0.0499	1.0000			
prisec	-0.0661	0.0770	0.1586	-0.0579	1.0000		
certprp	-0.0893	0.0619	-0.2138	-0.3567	-0.1981	1.0000	
diploma	-0.0268	0.0602	0.0097	0.0763	-0.1749	-0.2398	1.0000
degreema	0.1375	-0.1476	0.0626	0.2730	-0.3691	-0.5062	-0.4470

	degreema
degreema	1.0000

.

Annex 9

Estimation Result of Probit and Tobit Models resident of lake Babogaya

```
. probit wtp sex age mstatus fsize edu income psubs occu jobopp hhmwork dist  prp diplm degmas,
> r

Iteration 0:   log pseudolikelihood = -50.040242
Iteration 1:   log pseudolikelihood = -25.360995
Iteration 2:   log pseudolikelihood =  -22.42003
Iteration 3:   log pseudolikelihood = -22.040916
Iteration 4:   log pseudolikelihood = -22.034417
Iteration 5:   log pseudolikelihood = -22.034191
Iteration 6:   log pseudolikelihood = -22.034179
Iteration 7:   log pseudolikelihood = -22.034177

Probit regression                                 Number of obs   =        100
                                                  Wald chi2(14)   =     338.84
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -22.034177                 Pseudo R2       =     0.5597
```

wtp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.9234239	.476748	1.94	0.053	-.0109851	1.857833
age	-.0378675	.0217438	-1.74	0.082	-.0804845	.0047495
mstatus	.8380396	.4813269	1.74	0.082	-.1053439	1.781423
fsize	-.1237633	.1305155	-0.95	0.343	-.379569	.1320424
edu	-1.888724	.9795339	-1.93	0.054	-3.808575	.031127
income	.000255	.000149	1.71	0.087	-.000037	.000547
psubs	-1.857442	.6294625	-2.95	0.003	-3.091166	-.6237186
occu	-.5782815	.7050291	-0.82	0.412	-1.960113	.8035501
jobopp	.2863613	.5684967	0.50	0.614	-.8278719	1.400594
hhmwork	1.374544	.4232773	3.25	0.001	.5449357	2.204152
dist	-.0831208	.1759903	-0.47	0.637	-.4280555	.2618138
prp	1.988273	1.083893	1.83	0.067	-.1361183	4.112664
diplm	4.960208	2.116076	2.34	0.019	.812775	9.107641
degmas	6.045166	2.964439	2.04	0.041	.2349725	11.85536
_cons	1.693146	1.474365	1.15	0.251	-1.196556	4.582848

```
Note: 0 failures and 3 successes completely determined.
```

```
. dprobit wtp sex age mstatus fsize income psubs occu jobopp hhmwork dist prp diplm degmas,r

Iteration 0:   log pseudolikelihood = -50.040242
Iteration 1:   log pseudolikelihood = -26.832771
Iteration 2:   log pseudolikelihood = -23.376641
Iteration 3:   log pseudolikelihood = -22.215028
Iteration 4:   log pseudolikelihood = -22.043062
Iteration 5:   log pseudolikelihood = -22.035172
Iteration 6:   log pseudolikelihood = -22.035141

Probit regression, reporting marginal effects           Number of obs =    100
                                                        Wald chi2(13) =  54.36
                                                        Prob > chi2   = 0.0000
Log pseudolikelihood = -22.035141                       Pseudo R2     = 0.5597
```

wtp	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
sex*	.0718057	.0612316	1.94	0.053	.51	-.048206	.191817
age	-.0026731	.0019853	-1.74	0.082	38.29	-.006564	.001218
mstatus*	.0992406	.0883197	1.74	0.082	.83	-.073863	.272344
fsize	-.0087374	.0102716	-0.95	0.343	4.37	-.028869	.011395
income	.0000181	.0000118	1.73	0.084	3119.5	-5.0e-06	.000041
psubs*	-.3599038	.2035432	-2.95	0.003	.17	-.758841	.039033
occu*	-.0283708	.0252673	-0.82	0.411	.86	-.077894	.021152
jobopp*	.0174508	.0325481	0.50	0.614	.21	-.046342	.081244
hhmwork	.0970743	.0511195	3.25	0.001	1.96	-.003118	.197267
dist	-.0058727	.0121225	-0.47	0.637	2.1023	-.029632	.017887
prp*	.0066451	.0379326	0.17	0.866	.21	-.067702	.080992
diplm*	.0484472	.0416796	2.27	0.023	.19	-.033243	.130138
degmas*	.021755	.0370078	0.58	0.562	.19	-.050779	.094289
obs. P	.8						
pred. P	.9686337	(at x-bar)					

(*) dF/dx is for discrete change of dummy variable from 0 to 1
    z and P>|z| correspond to the test of the underlying coefficient being 0

```
. tobit mwtp sex age mstatus fsize income psubs occu jobopp hhmwork dist prp diplm degmas, ll

Tobit regression                                  Number of obs   =        100
                                                  LR chi2(13)     =      60.48
                                                  Prob > chi2     =     0.0000
Log likelihood = -434.61788                       Pseudo R2       =     0.0651

------------------------------------------------------------------------------
        mwtp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         sex |   8.096285   7.000718     1.16   0.251      -5.8184    22.01097
         age |   .0785764   .4225355     0.19   0.853    -.7612588    .9184115
     mstatus |   12.35791   9.937227     1.24   0.217    -7.393405    32.10922
       fsize |   1.687067   2.364975     0.71   0.478    -3.013576    6.387711
      income |    .004121   .0011186     3.68   0.000     .0018976    .0063444
       psubs |  -23.0349    10.44311    -2.21   0.030    -43.79172   -2.278083
        occu |   19.72088   12.13867     1.62   0.108     -4.40603    43.84779
      jobopp |   2.271835   8.449139     0.27   0.789    -14.52174    19.06541
     hhmwork |     2.2231   4.496241     0.49   0.622    -6.713666    11.15987
        dist |  -5.611574    2.44964    -2.29   0.024     -10.4805   -.7426492
         prp |   6.899609   8.986872     0.77   0.445    -10.96277    24.76199
       diplm |   5.629113   9.775739     0.58   0.566    -13.80123    25.05945
      degmas |   10.74462   10.49429     1.02   0.309    -10.11391    31.60315
       _cons |  -14.44633   20.62782    -0.70   0.486    -55.44636     26.5537
-------------+----------------------------------------------------------------
       /sigma |   30.88392   2.352071                      26.20893    35.55892
------------------------------------------------------------------------------

  Obs. summary:         12  left-censored observations at mwtp<=0
                        88     uncensored observations
                         0 right-censored observations

.
```

Marginal effects after tobit
      y = Pr(mwtp>0) (predict, pr(0, .))
         = .86323895

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
sex*	.0576218	.05051	1.14	0.254	-.041374	.156617	.51
age	.0005573	.003	0.19	0.853	-.005321	.006435	38.29
mstatus*	.1003578	.09183	1.09	0.274	-.079632	.280347	.83
fsize	.0119661	.0168	0.71	0.476	-.020963	.044896	4.37
income	.0000292	.00001	3.38	0.001	.000012	.000046	3119.5
psubs*	-.2061677	.11311	-1.82	0.068	-.427867	.015532	.17
occu*	.1744589	.12913	1.35	0.177	-.078635	.427552	.86
jobopp*	.015739	.05714	0.28	0.783	-.09626	.127738	.21
hhmwork	.015768	.03202	0.49	0.622	-.046981	.078517	1.96
dist	-.0398019	.0181	-2.20	0.028	-.075277	-.004326	2.1023
prp*	.0455231	.05533	0.82	0.411	-.06293	.153976	.21
diplm*	.0374879	.0611	0.61	0.540	-.082267	.157243	.19
degmas*	.0674779	.05822	1.16	0.246	-.046627	.181583	.19

(*) dy/dx is for discrete change of dummy variable from 0 to 1

.

Annex 10

Lake Kuriftu probit and Tobit model results of residents

```
. probit wtp sex age mstatus fsize income psub occ jobopp hhmwork dis prp dip dema,r

Iteration 0:   log pseudolikelihood = -48.622296
Iteration 1:   log pseudolikelihood = -26.376385
Iteration 2:   log pseudolikelihood = -24.327035
Iteration 3:   log pseudolikelihood =  -22.92408
Iteration 4:   log pseudolikelihood = -22.740753
Iteration 5:   log pseudolikelihood = -22.739356
Iteration 6:   log pseudolikelihood = -22.739355

Probit regression                                 Number of obs   =        100
                                                  Wald chi2(13)   =      47.88
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -22.739355                 Pseudo R2       =     0.5323
```

wtp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	1.919344	.6323079	3.04	0.002	.680043	3.158645
age	.0026688	.0243192	0.11	0.913	-.0449961	.0503336
mstatus	.5869042	.6046515	0.97	0.332	-.598191	1.771999
fsize	.2371051	.1465292	1.62	0.106	-.0500868	.524297
income	.0005724	.0002831	2.02	0.043	.0000175	.0011273
psub	-2.299903	.4457024	-5.16	0.000	-3.173464	-1.426343
occ	1.094924	.5449164	2.01	0.045	.0269071	2.16294
jobopp	.6893251	.6203714	1.11	0.267	-.5265805	1.905231
hhmwork	-.1120672	.2978598	-0.38	0.707	-.6958616	.4717272
dis	.1953329	.1692673	1.15	0.249	-.1364249	.5270907
prp	-.390706	.5162981	-0.76	0.449	-1.402632	.6212197
dip	1.643941	.7913461	2.08	0.038	.0929309	3.19495
dema	.1480322	.6984209	0.21	0.832	-1.220848	1.516912
_cons	-2.623251	1.04519	-2.51	0.012	-4.671785	-.5747175

```
Note: 0 failures and 9 successes completely determined.

.
```

```
. dprobit wtp sex age mstatus fsize income psub occ jobopp hhmwork dis prp dip dema,r

Iteration 0:   log pseudolikelihood = -48.622296
Iteration 1:   log pseudolikelihood = -27.970992
Iteration 2:   log pseudolikelihood = -24.968342
Iteration 3:   log pseudolikelihood = -24.086622
Iteration 4:   log pseudolikelihood = -23.018434
Iteration 5:   log pseudolikelihood = -22.751016
Iteration 6:   log pseudolikelihood = -22.739385
Iteration 7:   log pseudolikelihood = -22.739355

Probit regression, reporting marginal effects           Number of obs =    100
                                                        Wald chi2(13) =  47.88
                                                        Prob > chi2   = 0.0000
Log pseudolikelihood = -22.739355                       Pseudo R2     = 0.5323
```

wtp	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
sex*	.0445184	.0514231	3.04	0.002	.56	-.056269	.145306
age	.0000227	.000213	0.11	0.913	39.81	-.000395	.00044
mstatus*	.0084311	.0200669	0.97	0.332	.78	-.030899	.047762
fsize	.0020192	.0034375	1.62	0.106	4.37	-.004718	.008757
income	4.87e-06	7.03e-06	2.02	0.043	3331.5	-8.9e-06	.000019
psub*	-.1174041	.1183638	-5.16	0.000	.31	-.349393	.114585
occ*	.0288483	.0530267	2.01	0.045	.82	-.075082	.132779
jobopp*	.0045653	.0080116	1.11	0.267	.3	-.011137	.020268
hhmwork	-.0009544	.0027829	-0.38	0.707	1.83	-.006409	.0045
dis	.0016635	.0030018	1.15	0.249	1.9861	-.00422	.007547
prp*	-.0047024	.0101428	-0.76	0.449	.21	-.024582	.015177
dip*	.0065901	.0118945	2.08	0.038	.18	-.016723	.029903
dema*	.0011112	.0058783	0.21	0.832	.18	-.01041	.012632
obs. P	.81						
pred. P	.9972293	(at x-bar)					

(*) dF/dx is for discrete change of dummy variable from 0 to 1
    z and P>|z| correspond to the test of the underlying coefficient being 0

```
. tobit mwtp sex age mstatus fsize income psub occ jobopp hhmwork dis prp dip dema, ll

Tobit regression                                  Number of obs   =        100
                                                  LR chi2(13)     =     132.17
                                                  Prob > chi2     =     0.0000
Log likelihood = -407.88713                       Pseudo R2       =     0.1394
```

mwtp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex	4.55326	5.861284	0.78	0.439	-7.096676	16.2032
age	-.0074665	.2889829	-0.03	0.979	-.5818514	.5669183
mstatus	6.898305	7.574788	0.91	0.365	-8.157405	21.95402
fsize	.8014227	1.499668	0.53	0.594	-2.179329	3.782174
income	.0051163	.0004612	11.09	0.000	.0041996	.0060331
psub	-24.00492	5.753803	-4.17	0.000	-35.44122	-12.56861
occ	4.322011	7.692093	0.56	0.576	-10.96686	19.61088
jobopp	12.30692	5.377824	2.29	0.025	1.617907	22.99592
hhmwork	6.822493	3.377076	2.02	0.046	.1101895	13.5348
dis	-1.974108	1.825341	-1.08	0.282	-5.602171	1.653954
prp	7.732822	6.598956	1.17	0.244	-5.383317	20.84896
dip	10.6861	7.171341	1.49	0.140	-3.567719	24.93992
dema	17.5916	7.147958	2.46	0.016	3.384264	31.79894
_cons	-13.49372	12.4634	-1.08	0.282	-38.26608	11.27865
/sigma	23.12728	1.747024			19.65488	26.59968

```
  Obs. summary:         12  left-censored observations at mwtp<=0
                        88     uncensored observations
                         0 right-censored observations
```

```
. mfx compute, predict (pr(0, .))

Marginal effects after tobit
      y  = Pr(mwtp>0) (predict, pr(0, .))
         =  .90091356
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
sex*	.0348792	.04611	0.76	0.449	-.055495	.125253	.56
age	-.0000563	.00218	-0.03	0.979	-.004325	.004213	39.81
mstatus*	.0577896	.0708	0.82	0.414	-.080975	.196554	.78
fsize	.0060408	.01132	0.53	0.594	-.016151	.028233	4.37
income	.0000386	.00001	5.81	0.000	.000026	.000052	3331.5
psub*	-.23028	.07271	-3.17	0.002	-.372786	-.087774	.31
occ*	.0351465	.0675	0.52	0.603	-.097141	.167435	.82
jobopp*	.0813126	.03405	2.39	0.017	.014584	.148042	.3
hhmwork	.0514255	.02669	1.93	0.054	-.000879	.10373	1.83
dis	-.0148801	.01404	-1.06	0.289	-.04239	.01263	1.9861
prp*	.0514254	.03955	1.30	0.193	-.026084	.128935	.21
dip*	.0664807	.03822	1.74	0.082	-.00843	.141392	.18
dema*	.0970667	.03328	2.92	0.004	.031848	.162286	.18

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Annex 11

Estimation Result of Probit and Tobit Models lake Kuriftu visitors

```
. probit wtp sexr ager mstatusr fsizer incomer disr notripr tcostvr psubistr fvcame ocupr certp
> rp diploma degreema,r

Iteration 0:   log pseudolikelihood = -59.253757
Iteration 1:   log pseudolikelihood = -29.866697
Iteration 2:   log pseudolikelihood = -24.095863
Iteration 3:   log pseudolikelihood = -23.245078
Iteration 4:   log pseudolikelihood = -23.225237
Iteration 5:   log pseudolikelihood = -23.225177
Iteration 6:   log pseudolikelihood = -23.225177

Probit regression                                 Number of obs   =        103
                                                  Wald chi2(14)   =      55.53
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -23.225177                 Pseudo R2       =     0.6080
```

wtp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
sexr	.3934224	.4150692	0.95	0.343	-.4200982	1.206943
ager	-.0257997	.0298366	-0.86	0.387	-.0842783	.0326789
mstatusr	1.031201	.5301553	1.95	0.052	-.0078843	2.070286
fsizer	-.0056566	.1076765	-0.05	0.958	-.2166986	.2053855
incomer	.0001938	.0001088	1.78	0.075	-.0000195	.0004071
disr	-.0155089	.0062126	-2.50	0.013	-.0276853	-.0033324
notripr	.2552034	.2083257	1.23	0.221	-.1531074	.6635143
tcostvr	.0010675	.0003801	2.81	0.005	.0003226	.0018125
psubistr	-1.917465	.5368991	-3.57	0.000	-2.969768	-.8651618
fvcame	.4104565	.5267849	0.78	0.436	-.6220229	1.442936
ocupr	.3320739	.6863359	0.48	0.629	-1.01312	1.677268
certprp	.2896424	.6704868	0.43	0.666	-1.024488	1.603772
diploma	1.492991	.7072462	2.11	0.035	.1068137	2.879168
degreema	1.784577	.6717739	2.66	0.008	.4679242	3.10123
_cons	-1.145002	1.151483	-0.99	0.320	-3.401868	1.111863

```
Note: 0 failures and 5 successes completely determined.
```

```
. dprobit wtp sexr ager mstatusr fsizer incomer disr notripr tcostvr psubistr fvcame ocupr cert
> prp diploma degreema, r

Iteration 0:   log pseudolikelihood = -59.253757
Iteration 1:   log pseudolikelihood =  -31.99964
Iteration 2:   log pseudolikelihood = -27.039023
Iteration 3:   log pseudolikelihood = -23.887998
Iteration 4:   log pseudolikelihood = -23.269697
Iteration 5:   log pseudolikelihood = -23.225484
Iteration 6:   log pseudolikelihood = -23.225177

Probit regression, reporting marginal effects          Number of obs =    103
                                                       Wald chi2(14) =  55.54
                                                       Prob > chi2   = 0.0000
Log pseudolikelihood = -23.225177                      Pseudo R2     = 0.6080
```

wtp	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
sexr*	.0222808	.0240115	0.95	0.343	.553398	-.024781	.069342
ager	-.0013751	.0015375	-0.86	0.387	32.9223	-.004389	.001638
mstatusr*	.0905186	.0706244	1.95	0.052	.708738	-.047903	.22894
fsizer	-.0003015	.0057025	-0.05	0.958	4.38835	-.011478	.010875
incomer	.0000103	6.85e-06	1.78	0.075	5359.22	-3.1e-06	.000024
disr	-.0008266	.0005715	-2.50	0.013	52.6214	-.001947	.000294
notripr	.0136023	.0119973	1.23	0.221	2.4466	-.009912	.037117
tcostvr	.0000569	.0000363	2.81	0.005	1016.18	-.000014	.000128
psubistr*	-.295076	.1660453	-3.57	0.000	.223301	-.620519	.030367
fvcame*	.0175836	.0198791	0.78	0.436	.213592	-.021379	.056546
ocupr*	.0230685	.062737	0.48	0.628	.893204	-.099894	.146031
certprp*	.013179	.026073	0.43	0.666	.213592	-.037923	.064281
diploma*	.0398465	.0273913	2.11	0.035	.174757	-.013839	.093532
degreema*	.125392	.0868721	2.66	0.008	.485437	-.044874	.295658
obs. P	.7378641						
pred. P	.9775948	(at x-bar)					

```
(*) dF/dx is for discrete change of dummy variable from 0 to 1
    z and P>|z| correspond to the test of the underlying coefficient being 0
```

```
. tobit mwtp sexr ager mstatusr fsizer incomer disr notripr tcostvr psubistr fvcame ocupr certp
> rp diploma degreema, ll

Tobit regression                                  Number of obs   =        103
                                                  LR chi2(14)     =     102.05
                                                  Prob > chi2     =     0.0000
Log likelihood = -391.09688                       Pseudo R2       =     0.1154
```

mwtp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sexr	5.489978	4.96913	1.10	0.272	-4.383578	15.36353
ager	-.1214326	.4106628	-0.30	0.768	-.9374108	.6945457
mstatusr	5.512452	6.460946	0.85	0.396	-7.32531	18.35021
fsizer	1.337944	1.373793	0.97	0.333	-1.391753	4.067641
incomer	.0026006	.0005104	5.10	0.000	.0015864	.0036147
disr	-.0539964	.0689625	-0.78	0.436	-.1910235	.0830307
notripr	6.56274	1.378183	4.76	0.000	3.82432	9.301161
tcostvr	.003485	.0016079	2.17	0.033	.00029	.0066799
psubistr	-25.58183	6.490679	-3.94	0.000	-38.47867	-12.68499
fvcame	-8.755015	6.199322	-1.41	0.161	-21.07294	3.562906
ocupr	1.468186	9.029384	0.16	0.871	-16.47301	19.40938
certprp	.5538214	9.323106	0.06	0.953	-17.97099	19.07863
diploma	19.34179	9.439863	2.05	0.043	.5849873	38.0986
degreema	10.6037	8.805579	1.20	0.232	-6.892796	28.1002
_cons	-15.68301	15.77157	-0.99	0.323	-47.02079	15.65476
/sigma	22.19067	1.735644			18.74198	25.63935

```
  Obs. summary:         19  left-censored observations at mwtp<=0
                        84     uncensored observations
                         0 right-censored observations

.
```

```
. mfx compute, predict (pr(0, .))

Marginal effects after tobit
      y  = Pr(mwtp>0) (predict, pr(0, .))
         =  .88116851
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
sexr*	.0499639	.04669	1.07	0.285	-.041551	.141479	.553398
ager	-.0010871	.00368	-0.30	0.768	-.008309	.006134	32.9223
mstatusr*	.0524332	.06561	0.80	0.424	-.076165	.181031	.708738
fsizer	.0119781	.01242	0.96	0.335	-.012357	.036313	4.38835
incomer	.0000233	.00001	4.20	0.000	.000012	.000034	5359.22
disr	-.0004834	.00062	-0.78	0.436	-.001701	.000734	52.6214
notripr	.0587536	.01477	3.98	0.000	.029806	.087701	2.4466
tcostvr	.0000312	.00001	2.09	0.036	2.0e-06	.00006	1016.18
psubistr*	-.3124698	.10183	-3.07	0.002	-.512052	-.112888	.223301
fvcame*	-.0890767	.07163	-1.24	0.214	-.229478	.051325	.213592
ocupr*	.0135504	.0859	0.16	0.875	-.154804	.181905	.893204
certprp*	.0049164	.08209	0.06	0.952	-.155976	.165809	.213592
diploma*	.123144	.04661	2.64	0.008	.031787	.214501	.174757
degreema*	.0945108	.08012	1.18	0.238	-.062522	.251544	.485437

```
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
```

Annex 12

Estimation Result of Probit and Tobit Models lake Babogaya visitors

```
. probit wtp sex age mstatus fsize income dist notrip tcostvi sub fvcame occu initialbid cerprp
>  diploma degmas,r

Iteration 0:   log pseudolikelihood =  -50.69867
Iteration 1:   log pseudolikelihood = -31.679566
Iteration 2:   log pseudolikelihood = -28.715087
Iteration 3:   log pseudolikelihood = -28.165298
Iteration 4:   log pseudolikelihood = -28.150728
Iteration 5:   log pseudolikelihood = -28.150698
Iteration 6:   log pseudolikelihood = -28.150698

Probit regression                                 Number of obs   =        103
                                                  Wald chi2(15)   =      46.35
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -28.150698                 Pseudo R2       =     0.4447
```

wtp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.1348032	.4040197	0.33	0.739	-.6570608	.9266672
age	-.0616766	.0304945	-2.02	0.043	-.1214447	-.0019085
mstatus	.421547	.4894198	0.86	0.389	-.5376982	1.380792
fsize	.1841938	.1052996	1.75	0.080	-.0221896	.3905772
income	.0003504	.0001257	2.79	0.005	.0001041	.0005967
dist	-.0068756	.0018943	-3.63	0.000	-.0105884	-.0031629
notrip	.1297691	.0853498	1.52	0.128	-.0375133	.2970516
tcostvi	.0009414	.000542	1.74	0.082	-.0001209	.0020037
sub	-.8327064	.3785329	-2.20	0.028	-1.574617	-.0907954
fvcame	.5611428	.4875969	1.15	0.250	-.3945295	1.516815
occu	.156942	.7799656	0.20	0.841	-1.371762	1.685646
initialbid	-.0819419	.0723602	-1.13	0.257	-.2237652	.0598815
cerprp	.1716678	.499468	0.34	0.731	-.8072714	1.150607
diploma	1.451452	.6989672	2.08	0.038	.0815019	2.821403
degmas	.4325582	.5781688	0.75	0.454	-.7006318	1.565748
_cons	.6757006	1.151243	0.59	0.557	-1.580695	2.932096

```
Note: 0 failures and 5 successes completely determined.
```

```
. dprobit wtp sex age mstatus fsize income dist notrip tcostvi sub fvcame occu initialbid cerpr
> p diploma degmas,r

Iteration 0:   log pseudolikelihood =  -50.69867
Iteration 1:   log pseudolikelihood = -33.253393
Iteration 2:   log pseudolikelihood =    -29.919
Iteration 3:   log pseudolikelihood = -28.568947
Iteration 4:   log pseudolikelihood = -28.178681
Iteration 5:   log pseudolikelihood = -28.150868
Iteration 6:   log pseudolikelihood = -28.150698

Probit regression, reporting marginal effects          Number of obs =    103
                                                       Wald chi2(15) =  46.35
                                                       Prob > chi2   = 0.0000
Log pseudolikelihood = -28.150698                      Pseudo R2     = 0.4447
```

wtp	dF/dx	Robust Std. Err.	z	P>|z|	x-bar	[95% C.I.]	
sex*	.0083972	.0263792	0.33	0.739	.679612	-.043305	.0601
age	-.0036581	.0034196	-2.02	0.043	31.8058	-.01036	.003044
mstatus*	.0276955	.0466442	0.86	0.389	.601942	-.063725	.119117
fsize	.0109248	.0099985	1.75	0.080	3.78641	-.008672	.030522
income	.0000208	.0000108	2.79	0.005	4519.42	-4.8e-07	.000042
dist	-.0004078	.0002618	-3.63	0.000	53.4854	-.000921	.000105
notrip	.0076968	.0058279	1.52	0.128	3.68932	-.003726	.019119
tcostvi	.0000558	.0000437	1.74	0.082	492.505	-.00003	.000142
sub*	-.0764857	.0637003	-2.20	0.028	.252427	-.201336	.048365
fvcame*	.0274242	.0277154	1.15	0.250	.291262	-.026897	.081745
occu*	.0105383	.0629211	0.20	0.841	.902913	-.112785	.133861
initia~d	-.0048601	.0053773	-1.13	0.257	6.15534	-.015399	.005679
cerprp*	.0093969	.02654	0.34	0.731	.252427	-.042621	.061414
diploma*	.0465018	.0325902	2.08	0.038	.194175	-.017374	.110377
degmas*	.0217648	.0275231	0.75	0.454	.281553	-.032179	.075709
obs. P	.8058252						
pred. P	.9745571	(at x-bar)					

(*) dF/dx is for discrete change of dummy variable from 0 to 1
    z and P>|z| correspond to the test of the underlying coefficient being 0

```
. tobit mwtp sex age mstatus fsize income dist notrip tcostvi sub fvcame occu initialbid cerprp
>  diploma degmas, ll

Tobit regression                                  Number of obs   =        103
                                                  LR chi2(15)     =      51.77
                                                  Prob > chi2     =     0.0000
Log likelihood = -446.22215                       Pseudo R2       =     0.0548
```

mwtp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex	3.247403	8.872993	0.37	0.715	-14.38581	20.88061
age	-.6636781	.6292127	-1.05	0.294	-1.914106	.5867498
mstatus	10.93197	9.7402	1.12	0.265	-8.424626	30.28858
fsize	1.637768	1.92729	0.85	0.398	-2.192315	5.467852
income	.0013433	.0007868	1.71	0.091	-.0002202	.0029069
dist	-.1670504	.0553457	-3.02	0.003	-.2770384	-.0570624
notrip	-.8729261	.896337	-0.97	0.333	-2.654207	.9083552
tcostvi	.0131673	.0073533	1.79	0.077	-.0014459	.0277805
sub	-16.23924	9.550084	-1.70	0.093	-35.21803	2.73954
fvcame	14.83653	8.817488	1.68	0.096	-2.686374	32.35943
occu	17.63987	15.17444	1.16	0.248	-12.51614	47.79588
initialbid	-5.818716	1.711191	-3.40	0.001	-9.21935	-2.418083
cerprp	17.39852	11.29873	1.54	0.127	-5.055341	39.85238
diploma	29.05402	12.15038	2.39	0.019	4.907693	53.20036
degmas	44.36448	12.37418	3.59	0.001	19.7734	68.95555
_cons	28.3504	24.02193	1.18	0.241	-19.38814	76.08894
/sigma	36.57148	2.796714			31.0136	42.12936

```
  Obs. summary:         16  left-censored observations at mwtp<=0
                        87     uncensored observations
                         0 right-censored observations
```

```
. mfx compute, predict (pr(0, .))

Marginal effects after tobit
      y  = Pr(mwtp>0) (predict, pr(0, .))
         =  .75708336
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
sex*	.0280881	.07761	0.36	0.717	-.124023	.180199	.679612
age	-.0056787	.00542	-1.05	0.295	-.016297	.00494	31.8058
mstatus*	.0953042	.0867	1.10	0.272	-.074629	.265238	.601942
fsize	.0140134	.01654	0.85	0.397	-.018397	.046424	3.78641
income	.0000115	.00001	1.69	0.091	-1.8e-06	.000025	4519.42
dist	-.0014293	.00049	-2.92	0.004	-.00239	-.000469	53.4854
notrip	-.0074691	.0077	-0.97	0.332	-.022554	.007616	3.68932
tcostvi	.0001127	.00006	1.77	0.077	-.000012	.000237	492.505
sub*	-.1483101	.09249	-1.60	0.109	-.329581	.032961	.252427
fvcame*	.1189246	.06643	1.79	0.073	-.011284	.249133	.291262
occu*	.1683716	.15716	1.07	0.284	-.139662	.476405	.902913
initia~d	-.0497872	.01523	-3.27	0.001	-.07963	-.019944	6.15534
cerprp*	.1357547	.08071	1.68	0.093	-.022442	.293951	.252427
diploma*	.2030823	.06955	2.92	0.004	.06676	.339405	.194175
degmas*	.302761	.07045	4.30	0.000	.164682	.44084	.281553

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Annex 13

A Contingent Valuation Survey Questionnaire

Addis Ababa University

Department of Economics

A Contingent Valuation Survey Questionnaire for residents of Lake Babogaya

Code: _____

Place of interview: _____ (kebeles number

Name of lake: _____

Binging of the Interview: _____ end of the interview: _____

Date of interview: _____

Supervisor: _____

Interviewer: read the following before to start the interview

First I would like to thank for taking your time to participate in this interview. My name is _____. I am assisting ongoing research by Ms. Nigiste Abebe, in partial fulfilment of her MSc degree at Addis Ababa University. As most of the questions have to do with your attitudes and opinion, there is no right or wrong answer. This is purely an academic research. You are selected randomly from resident/ visitor of lake Babogaya and lake Kuriftu.

Confidentiality: This interview is completely confidential. Your answer will be used only by the researcher to analyze the survey result. Therefore, feel free to express your view honestly!

Section A

1. Which of the following benefit do you get from a lake Babogaya?

A. recreational (Swimming, Bird Watching, walking, boating) C. for farming

B. as sources of water for cattle dirking and washing cloth D. for fishing

E. other (please state) _____

2. Do you believe the existing situation of the lake Babogaya is well conserved?

A. Yes B. No

3. What do you think about the direct use value of Lake Babogaya (i.e. recreation value, fish, aquaculture, transport, vegetable, etc)?

A. high B. medium C. low

4. What about the indirect use values of lake Babogaya/lake Kuriftu (i.e. biological and global life supports, conservation and climate modulation)?

A. high B. medium C. low

5. What about the total economic values of lake Babogaya (i.e. biological and global life supports, conservation and climate modulation)?

A. high B. medium C. low

6. Which problem you observed in the area most frequently? (You can tick more than one alternative)

A. reduction in water quality

B. Pollution in surrounding area and a part of the lake

C. The water quantity of the lake reduce through time

D. endangerment of different species

E. Improper utilization of the lake resource

F. other (please state) _____

7. Here, there is the problem of quality reduction at vast with other additional problem, as residents of Bishoftu, what do you suggest the solution about the problem of lake Babogaya?

_____

8. If you lost Lake Babogaya in near future due to deterioration, do you think that can be easily substitute by any other lake?

A. Yes B. No

9. Who do you think is more responsible body for protecting the lakes?

A. Government B. all community (user and non user)

C. visitors' D. recreational site owner and direct user

E .all F. if any specify_____

10. How do you measure the effort made so far by the municipality of the city to protect the lake?

A. very good B. good C. fair D. poor

11. Do you think that the lakes can be sustained without any lake protection program?

A. Yes B. No

Section B: Willingness to pay for Lake Protection

Assume you are offered protection program for lakes Babogaya. This protection plan included:

- clean up the surrounding environment of the Lake
- improve water quality of the lake
- establish sustainable and manageable way of lake usage
- To improve the water quantity

This Protection program implementations depend on the threat exists around and part of Lake. This proposed situation requires an extra amount of money from different sources

(from users and non users). The study is to observe the willingness to pay from residents and visitors. Residents and visitors are not the only source of finance rather they cover the required extra financial source in additional to government and recreational site owners. So, your answer helps for the success of the project. Therefore, please respond your real willingness and ability to pay for protection of the Lake by considering your own budget constraint.

12. Do you think that it is good if new lake Protection plan will be established to protect Lake Babogaya?

A. Yes B. No

13. If your answer for question number '12' is "Yes", are you voluntary to contribute for this protection program?

A. Yes B. No

14. If your answer is "Yes" for question '15', why you need to support the Lake protection program? (You can answer more than one). Because_____

A. I live close to Lake B.I often visit the Lake

C. I am very keen on nature

D. I feel we should preserve the Lake for future generation

E. I am beneficiary from the lake

F. other (please state) _____

15. Are you willing to pay Birr 15 birr per family per season?

A. Yes B. No

16. Can you tell me your maximum amount that you are willing/ able to pay for the protection of Lake Babogaya? Birr_____ per family per season

17. If your answer for question number '15' is no can you tell me your reason?

A. I am not interested
B. I am not believe the money collect is for implementation of new project
C. Natural environment protection is state responsibility
D. I need but , I didn't have a potential to pay
E. If any specify_____

Section C: socio-economic characters

This is only for back ground purpose.

18. Sex

A. female B. male

19. How old are? _____

20. Marital status

A. Single B. Married C. Divorced D. Widowed

21. What is your responsibility in your family?

A. head of the household B. house wife

C. child D. other (please state) _____

22. What is your family size? _____

23. What is your educational level? _____

24. What is your occupation?

A. civil servant B. private employee C. traders

D. daily labour E. unemployed F. others_____

25. What is the distance between the lake and your house?

About _____ K. meters/ meters

26. Do you have a family member/s that has got a job opportunity in any recreational sites around the Lakes?

A. Yes B. No

27. How much is your monthly expenditure? _____

How much of this expenditure is covered by you? _____

28. How much is your average monthly income per month? _____

A. <=700 birr B. 701-1500 C.1501-2500 D. 2501-4000

E. 4001-6000 F.6001-10000 G. above10001 list it_____

29. If you do not have income source, do you get donation (family, relative, friend and remittance)? _____how much is that_____ per month

30. How many members of your family (excluding yourself) earn their own income? _____

Thank you

A Contingent Valuation Survey Questionnaire

Addis Ababa University

Department of Economics

A Contingent Valuation Survey Questionnaire for residents of lake Kuriftu

Code: _____

Place of interview: _____ (kebeles number)

Name of lake: _____

Binging of the Interview: _____ end of the interview: _____

Date of interview: _____

Supervisor: _____

Interviewer: read the following before to start the interview

First I would like to thank for taking your time to participate in this interview. My name is _____. I am assisting ongoing research by Ms. Nigiste Abebe, in partial fulfilment of her MSc degree at Addis Ababa University. As most of the questions have to do with your attitudes and opinion, there is no right or wrong answer. This is purely an academic research. You are selected randomly from resident/ visitor of lake Babogaya and lake Kuriftu.

Confidentiality: This interview is completely confidential. Your answer will be used only by the researcher to analyze the survey result. Therefore, feel free to express your view honestly!

Section A

1. Which of the following benefit do you get from a lake Kuriftu?

A. recreational (Swimming, Bird Watching, walking, boating) C. for farming

B. as sources of water for cattle dirking and washing cloth D. for fishing

E. other (please state) _____

2. Do you believe the existing situation of the lake Kuriftu is well conserved?

A. Yes B. No

3. What do you think about the direct use value of Lake Kuriftu (i.e. recreation value, fish, aquaculture, transport, vegetable, etc)?

A. high B. medium C. low

4. What about the indirect use values of lake Kuriftu (i.e. biological and global life supports, conservation and climate modulation)?

A. high B. medium C. low

5. What about the total economic values of lake Kuriftu (i.e. biological and global life supports, conservation and climate modulation)?

A. high B. medium C. low

6. Which problem you observed in the area most frequently? (You can tick more than one alternative)

A. reduction in water quality

B. Pollution in surrounding area and a part of the lake

C. The water quantity of the lake reduce through time

D. endangerment of different species

E. Improper utilization of the lake resource

F. other (please state) _____

7. Here, level of water reduction is the main problem of the lake Kuriftu. What do you suggest the solution about this and other additional problems of lake Kuriftu?

_____

8. If you lost Lake Kuriftu in near future due to deterioration, do you think that can be easily substitute by another lakes?

A. Yes B. No

9. Whom do you think is more responsible body for protecting the lakes?

A. Government B. all community (user and non user)

C. visitors' D. recreational site owner and direct user

E .all F. if any specify_____

10. How do you measure the effort made so far by the municipality of the city to protect the lake?

A. very good B. good C. fair D. poor

11. Do you think that the lakes can be sustained without any lake protection program?

A. Yes B. No

Section B: Willingness to pay for Lake Protection

Assume you are offered protection program for lake Kruiftu. This protection plan included:

- clean up the surrounding environment of the Lake
- improve water quality of the lake
- establish sustainable and manageable way of lake usage
- To improve the water quantity

This Protection program implementations depend on the threat exists around and part of Lake. This proposed situation requires an extra amount of money from different sources (from users and non users). The study is to observe the willingness to pay from residents and

visitors. Residents and visitors are not the only source of finance rather they cover the required extra financial source in additional to government and recreational site owners. So, your answer helps for the success of the project. Therefore, please respond your real willingness and ability to pay for protection of the Lake by considering your own budget constraint.

12. Do you think that it is good if new lake Protection plan will be established to protect Lake Kuriftu?

B. Yes B. No

13. If your answer for question number '12' is "Yes", are you voluntary to contribute for this protection program?

A. Yes B. No

14. If your answer is "Yes" for question '15', why you need to support the Lake protection program? (You can answer more than one). Because_____

A. I live close to Lake B.I often visit the Lake

C. I am very keen on nature

D. I feel we should preserve the Lake for future generation

E. I am beneficiary from the lake

F. other (please state) _____

15. Are you willing to pay Birr 15 birr per family per season?

A. Yes B. No

16. Can you tell me your maximum amount that you are willing/ able to pay for the protection of Lake Kuriftu? Birr_____ per family per season

17. If your answer for question number '15' is no can you tell me your reason?

F. I am not interested
G. I am not believe the money collect is for implementation of new project
H. Natural environment protection is state responsibility
I. I need but , I didn't have a potential to pay
J. If any specify_____

Section C: socio-economic characters

This is only for back ground purpose.

18. Sex

A. female B. male

19. How old are? _____

20. Marital status

A. Single B. Married C. Divorced D. Widowed

21. What is your responsibility in your family?

A. head of the household B. house wife

C. child D. other (please state)_____

22. What is your family size? _____

23. What is your educational level? _____

24. What is your occupation?

A. civil servant B. private employee C. traders

D. daily labour E. unemployed F. others_____

25. What is the distance between the lake and your house?

About _____ K. meters/ meters

26. Do you have a family member/s that has got a job opportunity in any recreational sites around the Lakes?

A. Yes B. No

27. How much is your monthly expenditure? _____

How much of this expenditure is covered by you? _____

28. How much is your average monthly income per month? _____

A. <=700 birr B. 701-1500 C.1501-2500 D. 2501-4000

E. 4001-6000 F.6001-10000 G. above10001 list it_____

29. If you do not have income source, do you get donation (family, relative, friend and remittance)? _____how much is that_____ per month

30. How many members of your family (excluding yourself) earn their own income? _____

Thank you!

For visitors of lake Babogaya

Addis Ababa University

Department of Economics

A Contingent Valuation Survey Questionnaire

Interviewer: read the following before to start the interview

First I would like to thank for taking your time to participate in this interview. My name is _____. I am assisting ongoing research by Ms. Nigiste Abebe, in partial fulfilment of her MSc degree at Addis Ababa University. As most of the questions have to do with your attitudes and opinion, there is no right or wrong answer. This is purely an academic research. You are selected randomly from resident/ visitor of lake Babogaya and lake Kuriftu.

Confidentiality: This interview is completely confidential. Your answer will be used only by the researcher to analyze the survey result. Therefore, feel free to express your view honestly!

Section A

1. Do you believe the existing situation of the lake Babogaya is well conserved?

A. Yes B. No

2. Which problem you observed in the area most frequently? (You can tick more than one alternative)

A. reduction in water quality

B. Pollution in surrounding area and a part of the lake

C. The water quantity of the lake reduce through time

D. endangerment of different species

E. Improper utilization of the lake resource

F. other (please state) _____

3. If you lost Lake Babogaya in near future due to deterioration, do you think that can be easily substitute by another lakes?

A. Yes B. No

4. What is the distance from the lake to your home?

About _____ K. meters/ meters

5. Are you visit this lake before this year?

A. Yes B. No

6. How many times you visit the lake this year? _____

7. In what form you come to this recreational site?

A. alone B. in group

8. What is your total expenditure for this trip of the recreational site? _____

Cost of transportation_____

Entrance fee_____

Others_____

9. Whom do you think is more responsible body for protecting the lakes?

A. Government B. all community (user and non user)

C. visitors' D. recreational site owner and direct user

E .all F. if any specify_____

10. Do you think that the lakes can be sustained without any lake protection program?

A. Yes B. No

Section B: Willingness to pay for Lake Protection

Assume you are offered protection program for lakes Babogaya. This protection plan included:

- clean up the surrounding environment of the Lake
- improve water quality of the lake
- establish sustainable and manageable way of lake usage
- To improve the water quantity

This Protection program implementations depend on the threat exists around and part of Lake. This proposed situation requires an extra amount of money from different sources (from users and non users). The study is to observe the willingness to pay from residents and visitors. Residents and visitors are not the only source of finance rather they cover the required extra financial source in additional to government and recreational site owners. So, your answer helps for the success of the project. Therefore, please respond your real willingness and ability to pay for protection of the Lake by considering your own budget constraint.

11. Do you think that it is good if new lake Protection plan will be established to protect Lake _____?

C. Yes B. No

12. If your answer for question number '11' is "Yes", are you voluntary to contribute for this protection program?

A. Yes B. No

13. If your answer is "Yes" for question '12', why you need to support the Lake protection program? (You can answer more than one). Because_____

A. I live close to Lake B.I often visit the Lake

C. I am very keen on nature

D. I feel we should preserve the Lake for future generation

E. I am beneficiary from the lake

F. other (please state) _____

14. Are you willing to pay Birr 4/10 birr person per visit ?

A. Yes B. No

15. Can you tell me your maximum amount that you are willing/ able to pay for the protection of Lake Babogaya? birr_____ person per visit

16. If your answer for question number '15' is no can you tell me your reason?

K. I am not interested
L. I am not believe the money collect is for implementation of new project
M. Natural environment protection is state responsibility
N. I need but , I didn't have a potential to pay
O. If any specify_____

Section C: socio-economic characters

This is only for back ground purpose.

17. Sex

A. female B. male

18. How old are? _____

19. Marital status

A. Single B. Married C. Divorced D. Widowed

20. What is your responsibility in your family?

A. head of the household B. house wife

C. child D. other (please state)_____

21. What is your family size? _____

22. What is your educational level? _____

23. What is your occupation?

A. civil servant B. private employee C. traders

D. daily labour E. unemployed F. others_____

24. What is the distance between the lake and your house?

About _____ K. meters/ meters

25. How much is your monthly expenditure? _____

How much of this expenditure is covered by you? _____

26. How much is your average monthly income per month? _____

A. <1500 birr B.1501-2500 C. 2501-4000

D. 4001-6000 E.6001-10000 F. above10001 list it _____

27. If you do not have income source, do you get donation (family, relative, friend and remittance)? _____how much is that_____ per month

Thank You!

For visitors of Lake Kuriftu

Addis Ababa University

Department of Economics

A Contingent Valuation Survey Questionnaire

Interviewer: read the following before to start the interview

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Section A

1. Do you believe the existing situation of the lake Kuriftu is well conserved?

A. Yes B. No

2. Which problem you observed in the area most frequently? (You can tick more than one alternative)

A. reduction in water quality

B. Pollution in surrounding area and a part of the lake

C. The water quantity of the lake reduce through time

D. endangerment of different species

E. Improper utilization of the lake resource

F. other (please state) _____

3. If you lost Lake Kuriftu in near future due to deterioration, do you think that can be easily substitute by another lakes?

A. Yes B. No

4. What is the distance from the lake to your home?

About _____ K. meters/ meters

5. Are you visit this lake before this year?

A. Yes B. No

6. How many times you visit the lake this year? _____

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11. Do you think that it is good if new lake Protection plan will be established to protect Lake _____?

D. Yes B. No

12. If your answer for question number '11' is "Yes", are you voluntary to contribute for this protection program?

A. Yes B. No

13. If your answer is "Yes" for question '12', why you need to support the Lake protection program? (You can answer more than one). Because_____

A. I live close to Lake B.I often visit the Lake

C. I am very keen on nature

D. I feel we should preserve the Lake for future generation

E. I am beneficiary from the lake

F. other (please state) _____

14. Are you willing to pay Birr 10 birr person per visit?

A. Yes B. No

15. Can you tell me your maximum amount that you are willing/ able to pay for the protection of Lake _____? birr_____ person per visit

16. If your answer for question number '15' is no can you tell me your reason?

P. I am not interested
Q. I am not believe the money collect is for implementation of new project
R. Natural environment protection is state responsibility
S. I need but , I didn't have a potential to pay
T. If any specify_____

Section C: socio-economic characters

This is only for back ground purpose.

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C. child D. other (please state)_____

21. What is your family size? _____

22. What is your educational level? _____

23. What is your occupation?

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D. daily labour E. unemployed F. others_____

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25. How much is your monthly expenditure? _____

How much of this expenditure is covered by you? _____

26. How much is your average monthly income per month? _____

A. <1500 birr B.1501-2500 C. 2501-4000

D. 4001-6000 E.6001-10000 F. above10001 list it _____

27. If you do not have income source, do you get donation (family, relative, friend and remittance)? _____how much is that_____ per month

Thank You!

DECLARATION

I, the undersigned, declare that this is my original work, has never presented for degree in any other university and that all source of material used for this thesis have been dully acknowledged.

Declared by:	Confirmed by:
Candidate	Dr. Wassie Birhanu
	Advisor
Signature……	Signature……..
Date: December, 2015	Data: December, 30, 2015

Place and date of submission: Addis Ababa University, December, 30, 2015